THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., JANUARY 14, 1892.

THE WEEK IN IRON CIRCLES.

General Features.

Without the existing fact, that the rate of pig iron production at the present time exceeds that of any time in the history of the iron trade, there would certainly be some decided advances, as some other conditions warranting this are plainly discernible. Nearly all branches of the iron business are fully occupied. Railroads are ordering freely of material, both for renewals and new equipment; steel rail mills will exceed their last year's production by a good round figure; nearly all of the car makers are crowded with orders, indicating the freeness in the money market; agricultural implement makers, stove manufacturers, machinists and jobbers are, with only here and there an exception, full of orders, and no apprehension of a stricture is now seen. The much talked of crops and profits to the carriers, however, frequently spoken of, are becoming a demonstrated fact more and more as time passes, and the exceptions, that these conditions will very soon help to absorb the large production noted and if possible a consumption equal to, if not exceeding, the production, while indulged in to some extent by the more sanguine, can really not be hoped for in the immediate future; hence, while trading should continue to improve and prices become more firm, no rise can justly be expected for some time to come except for certain special grades of metal. On the other hand rolling mills in the South state that the price of finished iron is nearly $4 a ton lower to-day with them than a year ago at this time, and that collections from Southern sources are not as good as during November of last year, the low price of cotton affecting the easiness of the money market in that district. Among pipe companies two of the largest have been shut down for repairs during the last month and report business very quiet and the outlook unsatisfactory. Among Southern car shops a large amount of work is reported, but the buying has not been heavy, they having supplied their wants during the Fall. At the leading trade centers the features chiefly visible are outlined in our summary below: At Cincinnati it is noted that many of the largest consumers quietly placed contracts in December for the bulk of their requirements for the early months of 1892. The rank and file of the trade, however, have not very much bought ahead, and in the aggregate the small orders cut a larger figure than the big ones. One Southern company booked 51,000 tons in December, and so far in January has sold at about the same ratio. At the close of the week they had withdrawn from the market, unless at advanced prices. At St. Louis there has been several round sized orders placed for deliveries during next six months at prices a shade below our quotations on another page. The year opened at Chicago with a good fair demand for iron of all kinds, especially coke brands. Some small lots of charcoal metal have been contracted for during past week, but the aggregate is not large. Prices remain on the basis last reported. As yet there is no improvement nor are there signs indicating that any change is likely to come at present. There is a large amount of coke iron, both Northern and Southern, being offered in the market, and competition for business is very brisk; where large buyers are prepared to consider the matter of purchase there are a number of furnaces ready to shade even bottom market prices. This condition can hardly last; with the large consumption and certainty of general prosperity during coming year, a stiffening in values must come before long. On Lake Superior charcoal iron several furnaces, which have been shading $17.00, now claim that they have withdrawn from the market and have no metal for sale while $17.00 continues to be market. Two or three of the most prominent brands are holding firmly at $17.50; refuse to consider sales for anything less. Sales for prompt delivery of grey forge at $10, furnace, have been made at Louisville, but iron upon lower basis from sources desiring money continue to be offered, though the amount in question is not large. There has been no increase in demand and consumers do not anticipate any special advance. What sales have been made have been at better figures than previously reported, and the tendency in car wheel irons is upward, one sale is reported of 1,200 tons of Nos. 3 and 4 at $16.50, cars, furnace, deliverable throughout the year. For Buffalo we have to report a largely increased inquiry with a liberal increase in sales. The situation in that vicinity indicates an advance in consumption in the near future. Almost without exception, consumers of pig iron are looking forward to increased business, which in some instances has already commenced. At Detroit purchasing has been good in the general foundry trade for both large and small amounts. Much interest is observed in Lake Superior charcoal, one notably round lot of 4,000 tons having been just purchased for delivery up to July of the present year.

The Local Situation.

The severe and unusually cold weather in the Central West, during the past week, seems to have retarded business to some extent, for the betterment reported in our last review has apparently come to a standstill, at least as far as the volume of business is concerned. On the contrary, the market is very quiet, and while no retrograde movement has set in, sales have fallen off to a noticeable extent. The price of Bessemer iron has undergone no change, the last sales reported being on a basis of $15 cash, in the valley. The ore situation is still one of great uncertainty, but the representations of the furnace trade seem to have had some effect, for the general tone among the ore men is not as bullish as it was a little while ago, and where, a month or so ago, the leading producers were certain that the advance in '92 would be all the way from seventy-five cents to $1.25, the opinion now expressed is that an average advance of fifty cents a ton will about cover the increased cost of '92 ore. The ore men advance the argument, and not without reason, that each year the cost of production increases at the mine, by reason of the additional timbering necessary in the older mines, while few new properties are being opened. So, for instance, the cost of mining a certain Gogebic non-Bessemer hematite, which three years ago was thirty cents a ton, has now advanced to more than four times that amount, while the price has declined. The opinion is freely expressed that another season like that of '91 will lead to the wiping out of weaker and smaller concerns, in the ore business as well as in the furnace trade, so as to concentrate the strength of the entire line as against other united interests that at present, by reason of their hostility to the iron business, are enabled to reap all the benefits. During all the season of depression, the railways have charged their old freight rates, and the coke syndicate has maintained its price of $1.90 for furnace coke. There have been built, however, recently, a great number of additional ovens, owned by independent parties, and almost anybody may lay in a supply of coke at, say, twenty cents below the rate. That the independent ovens are making inroads upon the syndicate appears from the fact that depite the enormous production of iron in the district supplied with Connellsville coke, the syndicate ovens are not nearly turning out the full capacity of their works, so that quite a bit of that business has been lost to the dictators. Although somewhat later than usual, the trade is furnished, this week, on another page, with the full report of the ore shipped in '91 from each mine in the Lake Superior country, and with a recapitulation of the shipments by ranges and by ports.

MINERAL PRODUCTION OF THE UNITED STATES IN 1891.

The *Engineering and Mining Journal*, of New York, has performed a distinguished service to the country by preparing thus early in 1892 a complete summary of the mineral production of the United States in 1891. It was a stupendous task which this enterprising journal set before it, but a review of the 75 pages of data and statistics would convince the merest tyro that the work has been comprehensively and completely done. We present herewith our contemporary's summary and refer our readers to its issue of January 2 for the full details:

MINERAL PRODUCTION OF THE UNITED STATES IN 1890 AND 1891.

	1890.	1891.
Gold, ounces	1,588,880	1,620,000
Silver, ounces	54,500,000	58,000,000
Pig iron, tons of 2,000 lbs	10,307,028	8,976,000
Steel rails, tons of 2,240 lbs	2,095,996	1,090,000
Copper, lbs	264,920,000	291,620,000
Lead, tons of 2,000 lbs	181,494	205,488
Zinc, tons of 2,000 lbs	66,342	76,500
Nickel, lbs	200,332	144,841
Quicksilver, flasks	22,926	21,022
Aluminum, lbs	94,881	163,820
Tin, lbs	.....	123,366
Antimony ore, tons of 2,240 lbs	.....	700
Anthracite coal, tons of 2,240 lbs	38,606,483	42,839,799
Bituminous coal, tons of 2,240 lbs	93,000,000	98,000,000
Phosphate rock, tons of 2,000 lbs	637,000	659,731
Salt, bbls. of 280 lbs	9,727,697	10,229,691
Bromine, lbs	310,000	415,000
Pyrites, tons of 2,000 lbs	109,431	112,438
Sulphur, tons of 2,000 lbs	.....	1,200

We congratulate the *Journal* upon this phenomenal achievement in trade journalism. Such promptness and completeness present the strongest possible argument against a permanent Census Bureau. With the *Journal's* annual *resume* what is the need of anything further?

CONDITION OF THE MACHINERY TRADE.

A comprehensive view of the machinery trade for 1891 shows that results generally were scarcely up to expectations. Manufacturers of light machinery report a falling off in sales, and, in some instances, the cutting down of the number of employes. Those concerns, however, that turn out special machinery and machine tools seem to have enjoyed a good year. On all hands, manufacturers of lathes, tools-grinders, and other metal-working machinery seem to have improved the opportunity of adding to and perfecting their plants, with a view to larger and better output in the future. There appears to have been plenty of work for makers of patent machinery, and enlargements are reported from several quarters. One manufacturer of light machinery notes a distinct drop of business since October 1st, but hopes for a good year in 1892. Conversely a concern manufacturing key-seating machines states that it booked orders in December for sixty days ahead. There has been a noticeable increase in the export trade of American machinery, especially of the finer grades.

Manufacturers of heavy machinery and machine tools appear to have been kept very busy. Enlargements of plant have been the order of the day in some directions. A well defined lull among manufacturers of this description of machinery took place between June and November, but the year as a whole was fairly good. There seems to have been an extra demand for power punches and shears, judging from the encouraging reports from various sources. Especially was this noticed during the last three months of 1891. Milling machines, too, were in good demand, the increased business necessitating material enlargements on the part of two or three of the heavier manufacturers. Iron planers have not, however, found as ready a market as desirable. Manufacturers of presses, dies and other sheet metal tools have had a good year, one feature of this business being the abandonment of the manufacture of automatic machinery and a return to standard designs. The bolt and nut machinery trade suffered somewhat from dullness during the year, but there has been an encouraging revival within the past three months.

It goes without saying that manufacturers of engines, boilers and steam-fittings have been kept busy. The increase in the demand for heavy-duty engines, including compound engines, has been quite marked. New electric lighting and power plants have taxed to the utmost the manufacturers of automatic engines, and numerous enlargements are reported. In portable and marine engines there has been an increase in foreign demand, and American made engines have been able to compete successfuly with English and German makes in distant markets. Water-tube boilers seem to advance steadily in popular favor.

Mining machinery has found a good market during the past twelve months, despite the financial pinch.

In wood-working machinery lines a very satisfactory condition of things is reported. Not only has there been a steady increase in home demand but the export trade has proven phenomenal—in large part owing to the reciprocity features of the present tariff act.

Manufacturers of hardware have had a good volume of business, but prices have not been satisfactory. Foundries have been generally well employed, particularly those running on specialties. Forges and blowers have had a good sale, and manufacturers are coming into the market this year with many new designs. Bridge builders and makers of structural iron have been "up to their eyes" in work.

As to the outlook for 1892, there is but one voice: "Exceedingly bright."

ESTEEMED CONTEMPORARIES.

Referring to *The Iron Trade Review's* remark that, "should the Pennsylvania tin-plate manufacturers adopt the suggestion of furnishing the roofing plate necessary to cover the buildings of the Pennsylvania exhibit at the World's Fair, an object lesson would be presented at once interesting and instructive," the *American Artisan* says:

> It would be interesting, and might prove one of the star exhibits of the whole show. Some affidavits had better come with it, though, but—would not this embarrass the gentlemen who are working up a "boom" for an additional cent per pound duty?

If the anti-American tinplate editor of the *Artisan* were made the custodian of the affidavits and were given the honor of laying the last sheet of roofing plate, the spectacle would be as diverting as it would be instructive.

The *National Labor Tribune* accepts in good part our correction of its statement that the Detroit Water-ways Convention approved the Pittsburgh and Lake Erie Ship Canal project and attributes its mistake to the press dispatches. It says, however:

> We cannot say that we agree with the convention in its assumption that there discretion in advocating one improvement at a time, except it be understood that that improvement is the beginning of the execution of a plan of well considered general improvements. We have no special bias in favor of the Lake Erie and upper Ohio canal as a work that the United States should undertake, but we are of the opinion that it would be a profitable water-way, hence of direct value to the lake region and to the Ohio valley, and indirectly to a wider extent of territory. Every section wants Congress to take hold of its improvements if there be the fraction of an excuse to apply therefor, and there is certainly a pretty big fraction of an excuse for asking that the great lakes and the upper Ohio, two waters which are under the jurisdiction of the federal government, should be joined in a navigable way. Yet, aware of the delay in such public works, and the extravagance of outlay for the same, we fancy it would be better for private enterprise to tackle the Erie and Ohio ship canal job. The canal would beyond reasonable doubt pay fair dividends, and there is abundance of private capital that is seeking solid 5 or 6 per cent. investment. The canal could thus be accomplished in a fraction of the time and at a fraction of the outlay of money that would be the case were the federal government to undertake the work.

The trouble with the Pittsburgh canal is that it is necessarily a local project. To be "in the swim" it should be on the line to the seaboard. The Detroit convention wisely gave it the go-by.

Both the *Canadian Manufacturer* and the Marquette (Mich.) *Mining Journal* quote approvingly *The Iron Trade Review's* recent editorial criticizing the stand of Andrew Carnegie in favor of political union with Canada. Says the *Journal:*

> As the *Mining Journal* has before suggested, we of the United States have all we can do at present to take care of and educate to a proper standard of citizenship the swarms of foreigners who are coming to us every year from across the sea, without undertaking to absorb and assimilate a whole country in addition. The time may come when it will be safe for us to annex Canada, but that will be after a very large shrinkage in the volume of immigration from abroad has taken place, and when a better adjustment of our political system to changed conditions shall have been affected. We have much to do in the way of familiarizing a large proportion of the population of the country with their place in and duty to the republic before we can stop to think seriously of annexing Canada. It may not be well to take the ground that the *Review* does, *i. e.*, that political union between the United States and Canada, now, or ever, is "out of the question," but is not feasible at present and will not be in the time of anybody now living. And what is the use of troubling ourselves about questions that must of necessity be left to those who come after us for settlement?

Canada is a great country, and we like her just enough to wish her the greatest possible future, whether as a province or as an independent republic, but as to yoking up with her—excuse us!

FROM the enterprising *Sentinel* we learn that the value of all the productive industries of Milwaukee during the year 1891 was $129,347,885. The amount paid in wages was $24,072,000, and the capital invested is $80,506,500. The number of employes in all the lines of industry is 55,890, and the number of establishments included in the report upon which these figures are based is 3,258. It can safely be said that there is no froth on the above statements.

MONEY AND MANUFACTURING.

WHAT LEADING CENTRAL WESTERN BANKERS SAY.

Money Easy, Farmers Happy, the Discouraging Features Few, and the Outlook for Investments in Manufacturing Lines Good.

With a view to obtaining summary of those best prepared to speak on the financial situation in the Central West, *The Iron Trade Review* recently addressed inquiries to leading banks, and has received the following interesting replies:

Mr. A. C. Anderson, Cashier of the St. Paul National Bank, St. Paul, Minn., writes:

"Answering your favor of 19th, I would say the general condition of the money market in this city is one of healthy activity, good business call, and supply adequate to meet legitimate wants. As compared with the last six months, of course, money is in more active demand than at that time, as at this time of year is always the case, owing to the crop movement, close of lake navigation, quarterly settlements, etc. The elements of strength in our local situation are, first, that we have seen a continuous liquidation for the past few years so that the speculative element is largely eliminated from the situation. Second, the phenomenal crops with which the Northwest has been blessed this year. Third, the favorable prices at which most of these crops have been, and are being marketed; this, in return, producing demand for another of our great products, lumber, which is firm at higher prices than of late; and it might be said in passing, that the disposition seems evident on the part of the debtor class to liquidate indebtedness rather than use their present means in expansion, so that locally I should say the situation is one of hopefulness along almost all lines and the unfavorable features, if such there be, will be the result of conditions more general in character than the local ones to which I have adverted. As to your second inquiry, it is an unfavorable fact that the assembling of Congress is almost always the signal for a more halting and uncertain business condition than would otherwise exist, and the more certain it seems to the public that no features of radical change will be adopted, the less this fact is true. The one element in the prospective legislation that probably causes more alarm than any other is the fear of free coinage of silver or so near a free coinage that the time may not be far distant when the country will be unable to maintain itself on a gold basis, and this is unquestionably affecting money in coming West. It is a great deal more unfavorable than those not in the financial lines can well understand. As showing the feeling along this line I would say I received two letters in one day, both looking to taking mortgages on property in this city, one from Pennsylvania and one from Massachusetts, and in each letter the one thing that was most emphatic was that these mortgages should be payable in gold coin of present weight and fineness. It is, of course, evident that the moment gold should command a premium, be it ever so slight, that moment it ceases to be money and becomes a commodity, and the fear that our circulating medium may be contracted by the amount of our gold in circulation is enough, so that every careful financier weighs well the shock that would follow such an event. Fourth, the Northwest with its vast lumber supply, and the Northern part of this State, in particular, with its splendid mines of iron is attracting and must continue to attract manufacturers, and the fact that such markets lie open to the manufacturer who is catering to the people of this section insures that more and more will money seek investment along those lines, and the very fact of a checked speculation aids always in the development of legitimate enterprises. The fact of the location in this city of the Walter A. Wood Harvesting Machine Co. speaks more strongly than could any mere theories that I might advance to you."

Mr. John P. Murphy, Cashier of the Plankinton Bank, Milwaukee, Wis., writes:

"In our opinion the general condition of the money market in this city is excellent, and has been improving right along on the past three months. Our packers, wheat receivers and large manufacturing interests have no trouble in obtaining the assistance they require at this season, and this in itself would indicate that money will be a 'drug,' so to speak, during the greater portion of the coming year. The elements of strength we deem to be, chiefly, the return of confidence occasioned by abundant crops and good prices; the fact that we have in circulation a larger amount of money (about $24 per capita) than we have ever had—at least, in recent years—and the pretty well defined belief that Congress will make no radical changes in the existing laws pertaining to finances. We do not think there are any unfavorable features in the financial situation at present, except to the bankers, who will find difficulty in loaning their funds to advantage. In our opinion, the prospects as to investments in manufacturing lines are excellent. They naturally would be so under the favorable financial conditions existing, and besides there does not seem to be any fear of unfavorable legislation in the near future. When the iron market gets a 'move on it'—and that must come soon—there will be a still further improvement on the situation with regard to manufacturing interests."

Mr. Theo. P. Gordon, Cashier of the National Bank of Columbus, Columbus, O., writes:

"First, the demand for money is good and at present close, as it always is about tax paying time. We believe from the present outlook, that there will be an active demand for money during the coming year at Fall rates. Iron and coal will largely contribute to this condition of things in this locality, and we look upon the prospect as very favorable in all lines of trade. Second, legislation, will not affect the situation nearly so much, as the agitation of legislative questions. Third, the prospect for investment in manufacturing lines is seriously affected by labor agitations. The labor situation is unfavorable to investments in that line."

The Union National Bank, Chicago, writes:

"Replying to your inquiries, we beg to say, first, that the condition of the money market during the past six months has been easy, and bids fair to continue so during the coming year; second, that the situation will probably not be affected by any legislative measures now before Congress, or in immediate prospect; third, that the prospects as to investments in manufacturing lines especially are encouraging."

The Commercial National Bank, Columbus, O., replies to our inquiries as follows:

"What is the general condition of the money market in your city, compared with the past six months?" "Easy and better." "What is the outlook for the coming year?" "Good." "What are the elements of strength in the financial situation?" "Conservatism." "What, if any, are the less favorable features?" "Overbuilding and real estate speculation. Taxation agitation is tending to drive money away." "How far is the situation affected by prospective legislatives measures in Congress?" "Not materially." "What are the prospects as to investments, especially in manufacturing lines?" "Nothing special here."

The Security Bank of Minneapolis, Minneapolis, Minn., writes:

"The market is very easy, our enormous crops so far as shipped, having been sold abroad for cash. At least one-third, probably more, is yet to come forward, and funds will be needed to carry on elevators until Spring. As to how far the situation is affected by the prospective legislative measures in Congress; so far we think not at all. Were the opposition in control, there cases would be far difficult. There must be quite a surplus of funds after debts are liquidated and we look for a healthy stimulus in the direction of manufacturing."

Mr. W. S. Power, Cashier of the First National Bank, Cincinnati, writes:

"Money is rather easier than it was six months ago, and promises to remain abundant during the Spring. We believe the manufacturers here to be doing well as a rule."

Mr. M. B. Wilson, President of the Capital National Bank, Indianapolis, writes:

"The general condition of the money market here is good; plenty of money, rates running from 6 to 8 per cent. We are located in the heart of the agricultural country and look for money to continue easy for the next year on account of such good crops. Our manufacturers are pushing things as much as they can. They are generally very much crowded with orders and turning out more work than ever before. They all seem in good spirits and to be making money."

Mr. Thos. P. Day, Cashier of the People's National Bank, Pittsburgh, Pa., writes:

"Money has been very easy here during all of the last six months, and is still abundant. Judging from ourselves, the demand has not been nearly equal to the supply. As to the effect Congressional legislation will have, it is so uncertain what will be done, from the present aspect of affairs, with the Democrats divided both as to the tariff and silver questions, that it would be difficult to say what the probable effects will be, without knowing what are going to be the probable causes, that is what the character of the legislation will be. As to the prospects for investments, we think confidence is being regained and unless something unforseen should occur to shake it again, the large amount of money now idle, will seek investment after the first of the year."

Iron Ore in Brazil.

A bulletin recently issued by the Bureau of American Republics states that the State of Minas Geress, in Brazil, abounds in iron ore. It is not found in veins or strata, buried deep in the earth, but in enormous beds, often lying at the surface, or in mountain masses. These vast deposits are worked only by small scattered furnaces, charcoal being used in the reduction of the ore. Of these small furnaces there are five groups, producing about 3,000 tons, annually, the product being used in the surrounding districts in the manufacture of articles of home consumption, such as hoes, shovels, picks, drills, nails, horse shoes, etc. In the State of San Paulo are found deposits similar to the best Norwegian ore, and one of the mines is worked by the government establishment, near the village of Sorocaba. This establishment has two furnaces, and produced in one year about 790 tons of pig iron. The ore has about 67 per cent. of iron. In Santa Catharina, not far from a harbor accessible to the largest vessels, are vast deposits of hematite, containing on an average 30 per cent. of manganese and from 25 to 30 per cent. of iron.

New Uses for Compressed Air.

A company in Paris for the supply of compressed air have made an important new departure in the inauguration of a large factory at the Porte D'Ivry for the purpose of placing a regular supply of compressed air at the disposal of consumers in every part of the capital. By this means private individuals, as well as manufacturing houses, can have motive power laid on to their dwellings or workshops, and adapted to their requirements. The air is compressed and distributed through underground pipes by machines of 2,000 horse power. Over 20,000 horse-power is provided, and 400,000 cubic meters of compressed air can be turned out per day. The supply is at present chiefly used for electric light production.

SPIRIT OF THE TRADE PRESS.

SOME POINTERS ON THE BUSINESS SITUATION.

Pittsburgh as an Iron Market.

There were bought and sold in the city during 1891 nearly 2,200,000 tons of pig iron. Add to this the production of furnaces that belong to mills and the Pittsburgh district may be fairly put down at not less than 3,000,000 tons. The figures of finished output of mills have not yet appeared, but, judging by the consumption of pig, the average daily output has been rather more than less than 7,000 tons.—[National Labor Tribune.

The Structural Iron Mills Quiet.

Aside from the sale of a lot of 300 tons of beams for the Lincoln Deposit Building, no transactions of consequence have been reported in structural material, the mills and merchants generally reporting the trade very dull. The figures for the production of American beams are not yet available, the reports not having been recived as yet. An excellent authority estimates the total at 100,000 net tons, which is less than is generally figured, and is said to be due to the unfavorable character of the general condition of business last year.—[Iron Age, Jan. 7.

A Good Year for Farm Implement Manufacturers.

Reports from dealers in all parts of the country published in this and last week's issues of *Farm Implement News* give a fair idea of last year's implement business. Everyone knows that it was a successful year—trade somewhat slow at the beginning, rushing in the middle and steady at the close. Collections were good where farmers sold their products and slow where they did not, but in the latter case they will surely improve as farmers market their stuff. There is a general anticipation of a big opening, next Spring, and a largely increasing trade as the season progresses should crop promises be fair and improve towards harvest.—[Farm Implement News, Chicago.

The Outlook from the Hardware Standpoint.

One of the most potent factors in our country's prosperity, which has become so much a matter of course with us that it goes on almost unnoticed, is the enormous increase in our population; averaging, not less than 2 000,000 per year, or 20,000,000 in a decade. Eight years hence, if we may judge the future by the past, this country will have about 85,000,000 of people, and at the end of the succeeding decade, at least, 110,000,000. While there will doubtless be lean years as well as fat years, there will be periods of panic and commercial depression, the conditions we have mentioned will surely place and keep the United States in the front rank among nations, and we may safely count on the years 1892 and 1893 as red-letter years in our country's commercial history.—[Hardware, New York.

The Improving Pig Iron Market.

Conditions have improved unquestionably during the last fortnight, the demand for Bessemer pig iron has strengthened and prices have made, what seems to be, a determined movement on the up-grade. The most satisfactory feature connected with the improvement has been the slow, unexcited dispositions which have, so far, characterized the change of conditions. This is the method that gives warrant for anticipating still greater improvement, but it is certain that all intelligent operators are decidedly disinclined to favor any rapid advances or big jumps. Bessemer pig metal is selling at $15.75@16.00, according to quality and the views of holders and buyers, and, it might be added, according to the financial conditions of makers. This is a good time to buy and not an extraordinarily good time to press sales.—["Cold Short" in Ohio Valley Manufacturer.

FOREIGN NEWS AND COMMENTS.

Why Canada is not a Large Producer of Pig Iron.

The reason why Canada is not a large producer of pig iron is that the duty is not high enough to encourage the enterprise, and because the Reform party are constantly declaring that should they ever attain to power they would place the article on the free list. The United States did not become a large producer of pig iron until the duty was raised to $9 per ton, and now that country produces more pig iron than even Great Britain. Our duty of $4 per ton is not sufficient inducement, and the bonus of $1 per ton for home-made iron is a delusion which deludes no furnaceman.—[Canadian Manufacturer.

A New Metal of High Resistance.

The Aluminum Brass & Bronze Co. announces a new metal which is exceedingly tough, very ductile, and when either hard or soft drawn into wire, possesses an extremely tensile strength, for ordinary size annealed it is 86,000 pounds per square inch, and for hard drawn 136,000 pounds per square inch. Its ductility is such that the annealed wire will stand 124 twists in six inches, and the hard drawn wire 30 twists. It solders with facility with resin, chloride of zinc, or any of the ordinary solders and fluxes. In electrical resistance, comparing this new metal, ordinary copper taken as one, German silver is 13, and the new metal is 35. It is this qualification that makes it valuable for resistance work in dynamo machinery, and all electrical apparatus. Its specific gravity is about the same as copper, which it resembles in finish.—[Iron and Coal Trades Review, London.

Clyde Shipbuilding in 1891.

The returns of shipbuilding on the Clyde during the year 1891 show that while the shipbuilding trade has been fairly brisk throughout the year, the total value of the output shows a decrease. The estimated total value is returned at £8,000,000, as compared with £9,400,000 for the year 1890. The cause of this large falling off in value is attributed to the large increase in sailing tonnage, fully 40,000 tons, and the large decline in steam tonnage, fully 82,000 tons; and also to the lower value paid for material. Wages, however, have been about as high as in the year 1890. War vessels launched on the Clyde during the past year present an aggregate tonnage of 15,267, showing an increase of 6,016 tons, and of these, four swift cruisers for the British Government aggregated 14,400 tons. There was also a cruiser for the Canadian Government, for the St. Lawrence; and another for the Egytian Government, for Customs protective purposes. The total number of vessels launched on the Clyde, of all kinds, was 373, of 322,010 tons.—[Iron and Steel Trades Journal, London.

Concerning "Cinder Pig."

The common class of crude iron known in South Staffordshire as "cinder pig" is made principally out of the slag or cinder from the puddling furnaces of the district, which is supposed to contain an average of something like forty per cent. of metal. It is not a little singular that, until quite recently, this slag or cinder was counted of so little value in the market, that the owners were not only willing to make a present of it to anyone who would take the trouble to cart it away, but in some cases they would even pay a trifle per load for its removal. The result is that enterprising pig iron makers have been able to sell cinder pigs at prices which although astonishingly low, have, considering the nominal cost of raw material, yielded a very fair profit. Not a little surprise is being manifested in the district that the managers of some of the large mills and forges should not have worked up this slag or cinder themselves on the spot, instead of giving it away to pig makers who can realise a profit from it after paying the cost of conveyance—in some cases several miles—to their own furnaces In any case, one would think a material containing forty per cent. of iron, could be so manipulated as to yield a fair market price as raw material instead of being, as now, designated as merely so much waste and rubbish, a free gift to anybody who will take the trouble to cart it away —[Colliery Guardian, London.

The Meyer Recarburising Process.

In the *Genie Civil*, M. E. Demenge describes a method of direct recarburising used by Herr Meyer, at the Dudelangen works, in the grand-duchy of Luxemburg, as applied to rail steel. Finely powdered anthracite mixed with 10 per cent. of milk of lime is molded by hand into bricks of ordinary building size, which are allowed to dry for a few months. When the charge in the basic converter is shown to be sufficiently dephosphorised by the ordinary method of testing, the slag is removed, and ferromanganese, with 80 per cent. of manganese, in the right proportion for deoxidising the overblown metal (0 5 per cent., or 90 lb. for an 8 ton charge), is thrown in, a few minutes being allowed to enable it to melt and diffuse through the mass During this time the ladle is prepared by throwing in 90 lb. of the anthracite bricks, which are crushed by a rammer and distributed uniformly over the bottom. In pouring the charge, a workman is placed on each side of the crane platform with a rake covered with refractory material, in order to prevent the slag in the converter flowing out with the metal, and the foreman, by means of the hydraulic mechanism, keeps the ladle slightly on the move both longitudinally and transversely, in order that the jet may impinge upon different parts of the surface successively. A violent reaction and evolution of carbonic oxide takes place when the metal meets the carbon, and for this reason the pouring must be done slowly at first in order to prevent the ladle from boiling over; but at a later period the reaction is beneficial for the stirring action of the gas promotes uniformity in the finished steel. When the casting is completed a portion of the slag is allowed to follow, so as to protect the metal against the action of the air, and the teeming into the ingot molds follow at once. The ingots obtained are perfectly sound and compact. A cast intended for rail making of the following composition:—Carbon, 0.52; manganese, 0.45; phosphorus, 0075; silicon, 0.00; and sulphur, 0.013 per cent.—gives a tensile strength of 40.13 tons per square inch, with 18.5 per cent. elongation. The same process has been successfully applied to the production of the hardest steels with 1.5 per cent. of carbon. The economy realised is considerable as compared with the method of recarburising with spiegel, 12 cwt. of the latter metal, which was formerly required for an 8-ton charge, being now replaced by 1 cwt. of dry coke, and the amount of ferro-manganese required is also reduced by one-half.

How to Cut the Hardest Steel.

It is well known that a smooth disk of steel driven at a high speed will cut in two a file held to the edge of the disk. The principle does not seem to have been practically used, save in one instance named by Mr. Richards, the well-known American engineer, who says that it was employed in the United States armory, at Springfield, Mass., in preparing a tenon or reduced section on the ends of tempered steel ramrods, such as were used in loading the muskets 25 years ago. The material was hard and could not be cut, so small wheels of iron about six inches in diameter and one inch thick were used. They were driven at 6,000 revolutions per minute, and melted or abraded the metal away instantly, at the same time drawing the temper so that a screw-thread could afterwards be cut on the end of the tempered rod.

The English Iron Markets.

Our English correspondents, S. W. Royse & Co., Birmingham, write us as follows (December 28) regarding the foreign iron market: There has been very little trade doing during the month in Glasgow warrants, and prices are unaltered. In Middlesbrough iron also business has been extremely dull until about a week ago, since which there has been a fair amount of buying, and prices have advanced about 9d. per ton. Shipments of pig iron from Middlesbrough up to the 19th inst. are returned as 49,006 tons, as compared with 44,948 tons during corresponding period of last year. The manufactured iron trade is quiet, little new business coming forward at present.

OF the big Lake Superior mines, the Chapin falls 254,094 tons short of its shipments in 1890; the Norrie is 148,156 tons behind; the Cleveland is about 80,000 tons short, and the Buffalo mines of the Negaunee have made a gain of 91,030 tons.

THE WORLD'S TWO GREATEST PIG IRON PRODUCERS IN 1891.

UNITED STATES.

The year 1891 was one of the most remarkable that the iron trade has ever experienced. Coming after two succeeding years of extraordinary activity, it began in the cloud of financial depression which overcast the whole world immediately after the collapse of Argentine securities in London, and the failure of the great English firm of Baring Brothers. In the United States, while the general financial condition was apparently excellent, there were enough reasons to cause a feeling of insecurity, if not of despondency. Crops had been below an average. The troubles in Europe had caused an unloading of railroad bonds upon the American market, and a consequent depression of every railroad security. The McKinley tariff act had just gone into effect, and its prospective results upon business were a matter of doubt. The Congressional elections in November presaged the possibility of an early repeal of that act, and the effect of such a repeal was still more uncertain. Legislation in the direction of free silver coinage was threatened. Some, or all, of these causes led to general want of confidence in investors, the stopping of new enterprises, the delay of repairs and renewals, and the general "hand to mouth" character of buying supplies which always characterizes times of depression, and moreover, tends to intensify and prolong it. The result upon the iron trade was immediate and extraordinary. The production of the blast furnaces, which had reached a maximum of over 180,000 gross tons per week in December, 1890, decreased to 114,000 tons in May, and the statistics issued by the American Iron and Steel Association in July showed that the production for the first six months of the year was only 3,776,556 net tons, as compared with 5,107,775 net tons in the corresponding six months of 1890, a decrease of 1,331,219 tons, or about 26 per cent. Such a rapid decrease was entirely unprecedented.

Not the least extraordinary feature of the history of these first six months of 1891 was the firmness with which prices were held, notwithstanding the decrease in demand. In all previous depressions in the iron trade there has been a fall from a position of large demand, large production and high prices down to one of small demand, small production and low prices; but in the depression of 1891 prices had not such a pinnacle to fall from as in the former ones. They were low enough already; the selling price of iron being apparently regulated by the bare cost of production at those furnaces whose locations and equipment are not the best, and which can make profit only when prices are moderately high. A drop of 50 cents a ton in the price of pig iron forces many such furnaces out of blast, and a rise of a dollar a ton or a decrease in the price of ore starts them again. The slight drop in price took place in January, 1891, Bessemer iron at Pittsburgh, as shown in our quotations elsewhere, falling from $16 75 in December, to $16.25 in January, and grey forge falling in the same time from $14 75 to $14 25. This drop had its effect, many furnaces went out of blast, and those that stayed in were strong enough to maintain prices, so that in March, with a greatly decreased demand and production, the price of Bessemer was $16 50 and of grey forge, $15. The strike in the coke regions, no doubt, had some effect in helping to maintain prices, but whatever the several causes, the result, a maintenance of prices in the face of an extraordinary decrease of demand, is altogether an exceptional occurrence. In the steel rail trade a similar firmness was manifested, rails being steadily quoted throughout the year at $30 per ton, but this was evidently due to the pooling agreement between the companies, and to the consolidation of the rail manufacture into the hands of a few companies of great financial strength, who were willing to delay receiving of orders for a year, if necessary, rather than cut prices. Not less remarkable than the extraordinary depression was the rapidity of recovery from it. By May 1st it had reached its worst, and during May and June many idle furnaces were blown in, and production increased to about the average of that of last year. A further light increase took place during the Summer and Fall, and by November 1st the maximum rate of production of over 180,000 gross tons reached in December, 1890, per week, had been reached and passed, and we close the year out with blast furnaces producing a greater quantity of iron than an at any previous period in our history. Yet, notwithstanding this increase of consumption and production prices have steadily declined toward the end of the year, and as shown in our quotations elsewhere, are in general lower than ever before in the history of the trade. The production of pig iron in the first six months of the year, according to the official statistics, was 3,776,556 net tons. We estimate that the production for the second half of the year will be just about the same as that of the second half of the year 1890, which was 5,199,253. The comparative figures of the two years will then stand as follows:

	1890.	1891.
1st half	5,107,775	3,776,556
2nd half	5,199,253	5,199,253
Total	10,307,028	8,975,809

Or practically a total for 1891, in round numbers, of 9,000,000 net tons, showing a decrease, as compared with 1890, of 1,300,000 tons, or nearly 13 per cent.

The production of steel rails, according to figures we have received from the Rail Makers' Association, is estimated at 1,090,000 tons, as compared with 2,095 996 tons in 1890, a decrease of over 1,000,000 tons, or nearly 50 per cent.

In our review of the iron trade one year ago (see *Journal* of January 3rd, 1891, page 3) we said: "There never was a time when the outlook into the immediate future of the iron trade was more uncertain than at present, and when it was more unsafe to make predictions." At this time, however, it requires no gift of prophecy to state that the production and consumption of pig iron will be greater in 1891 than in 1890, and we shall not be surprised if production of 1892 is 25 per cent. more than that of 1891, making the total of 1892 of 11,250,000, or even 11,500,000 tons.—[Engineering and Mining Journal, New York.

GREAT BRITAIN.

The course of trade during 1891 has been regulated by financial affairs, and as these have been unsettled, trade has throughout the year moved with halting steps, and the improvement of one month has been balanced by relapses in the following. In the iron, steel and allied industries, an expansion of trade began in 1888, and progressed steadily until the Baring crisis at the close of 1890 sent a cold shiver through the financial world. Though the immediate difficulties were tided over, and we were able to congratulate our readers at the opening of the year on our escape from appalling disasters, yet at the end of 1891 we are still reaping the evils of over trading with South America in 1889 90 All the outstanding liabilities in the Baring business have been discharged, the Bank of England having advanced £7,000,000 against securities, the value of which, at present, it would be difficult to estimate. On this sum, for another two years, the guarantors have to pay interest (4 per cent.), and in December, 1893, the Bank of England will call in such amounts from the subscribers to the guarantee fund, as may be required to cover the losses of the liquidation. In the interval, if Argentine finance can be resuscitated, and the bonds got back to par value, all may end happily, but the course of events in 1891 has not been very encouraging, and Argentine affairs are as unsettled as ever, while it is a significant point, that some Argentine stocks have fallen 45 per cent. during the year. The general contraction in South American trade was expected, and most people foresaw that the crisis in London would react on all the export markets. We have seen the effects of this in the monthly returns of our iron and steel exports, which from January to November have exhibited lighter shipments. Some of the diminution in our trade is attributed to American business lost through the working of the M'Kinley tariff. Our export of pig iron to the United States have been 50 per cent. below the average of the two preceding years, but this is owing to the development of the natural resources of America, not to the tariff. Of bar iron we have sent a heavier quantity to the States than in 1890. Our American trade in railroad material has been dying a natural death for years, and it whole value this year will be about £25,000. The tariff has effected the wire trade, reducing the business by one half, and makers of cotton ties have closed their American accounts, indeed some works making these a specialty have been abandoned. The tinplate trade has been principally affected by the M'Kinley Bill, in that it has put a great deal of money in the way of our manufacturers, has forced them to work hard in the first half of the year and left them without business for several months since the bill passed. But the tariff does not threaten to inflict any permanent or serious injury on the Welsh trade. * * *

According to the mineral statistics, the production of pig iron in 1890 was 7,900,000 tons, 318 000 tons less than in 1889. The statistics of the British Iron Trade Association state that the production in the first half of 1891 was 350,000 tons less than in the corresponding period of last year, and we think the whole make for 1891 has been less than 7½ million tons. Our exports of pig iron have been 300,000 tons less than in 1890, and on all hands the home demand has been lighter, but, undoubtedly, the reduced make has not equaled the general demand, and a further reduction in stocks has been effected. Scotch G M.B. pig iron warrants opened the year at 46s., and the price ranged between 46s. and 47s., when, after the settlement of the furnacemen's strike, and the re-starting of the furnaces, the market fell below 43s. After some heavy dealings in warrants, it became evident that the "bears" were oversold, and in May they were completely cornered, and had to pay 54s. and upwards to close their bargains. At the end of this month transactions occured at 5s. above this figure, but shortly afterwards the market price was nominally 53s. In July the price had declined to 47s., and has ranged round about this figure since, the market closing to-day at 47s. For months past there has been nothing doing on the Glasgow Exchange. Half a million tons of pig iron remains in Connal's stores, but none of the warrants are available for dealing, the whole being held by a syndicate. Makers' quotations for shipping brands of iron have declined about 7s. 6d. per ton during the year. The stock in Connal's stores at Glasgow was reduced about 80,000 tons in the first half of the year, but since July last practically nothing has gone either in or out of store.

The past year has been almost the worst in the records of the steel rail trade. At the opening of the year the current price of steel rails of ordinary heavy sections was £4 17s. 6d., the price gradually declined to £4 2s. 6d., and the year closes with a weak market at this figure. The rail mills throughout the country have had an idle year. Several firms have abandoned the rail trade entirely, others have practically only done occasional odd work, and at different times all the works have been idle. At the close of the year the work in hand, and in prospects, is not sufficient for the employment of one-half of the existing plant. The exports, which in 1890 exceeded 700,000 tons, have this year only slightly exceeded 550,000 tons. In Argentine business alone the decrease equals 200,000 tons. In January steel ship plates were quoted at £6 2s. 6d. in Cleveland; the Barrow price was £6 7s. 6d., and the Scotch makers were asking £6 10s. At the close of the year the prices are in Cleveland £5 17s. 6d., at Barrow £6 2s. 6d., and in Scotland £6 7s. 6d. The sustained activity in the shipbuilding trade has kept all the plate mills well employed throughout the year, and for the new mills erected in Scotland and on the Tyne plenty of work has been found.

Falling markets and restricted credits have been followed by more than an average number of financial embarrassments among export merchants. The Australian trade has suffered severely, and half a dozen houses have gone to the wall. In the South American trade disasters have followed in the wake of the crisis of November, 1890; but, on the whole, the storm has been weathered well.—[Iron and Steel Trades Journal, London.

FUEL GAS PROGRESS.

THE PETTIBONE-LOOMIS FUEL GAS PROCESS.

The Loomis generators are designed especially for making water-gas from bituminous coal. They are as well adapted for coke or coke breeze, anthracite or anthracite screenings, but as bituminous coal is now cheaper in most localities it is generally used. Figs. 1, 2 and 3 represent section and plan of Loomis gas apparatus for making water and producer-gas, and consists of a generator and boiler, of which a vertical section is shown in Fig. 1; exhauster and engine, producer gas valves, *b*; steam valves, *s*; water-gas seal, *n*; and necessary gas, steam and water pipes. The generator is cylindrical, constructed of iron or steel from 7 to 10 feet in diameter, and from 12 to 14 feet in height, the lining is of fire-brick with fire-brick arch grates, ash-pit and flue to boiler, *x*, in the bottom. It is provided with a door on top for firing and admission of air; water-gas outlet to seal near the top; three cleaning doors above grate and one below grate, opening into ash-pit. The vertical boiler is usually 3 feet in diameter and 20 feet high, of the multitubular type, and connected at its base with the generator. A positive exhauster is used, driven by an engine direct, and is connected with the top of the boiler by the pipe *y* and valves *h* and *h*. The plan, Fig. 3, shows two generators connected to one exhauster.

In starting fire in the generator a layer of coke or coal about four feet in depth is put in and ignited at the top, the exhauster creating a downward draught. When this body of fuel is ignited, coal is frequently charged, raising the fuel bed to about 7 feet above the grates, and there maintained. Bituminous coal is generally used, and is charged at intervals as needed, through feed door in the top of the generator. Air is also admitted through the same door, and by means of the exhauster is drawn down through the fresh charge of coal, and then through the hot fuel bed beneath. The resultant producer or generator-gas is drawn down through the grates and superheater, *w*, in the bottom of the generator, up through the vertical boiler to the exhauster, and thence is delivered into a gas-holder for supply to the furnaces. This gas-holder may be small, having to act only as a governor. The heat given off by the gas in passing through the vertical boiler is utilized in producing steam for making water-gas and for working the engines.

During the time of bringing the fuel to a state of incandescence, the feed door, *a*, on the top of the generator, is open, thus allowing the attendant to see the condition of the fuel bed. This first half of the operation requires from four to six minutes, after which the valve *b*, between the boiler and exhauster, is closed, as is also the feed door; and steam being introduced through the superheater, in the bottom of the generator, passes up through the incandescent fuel; the resultant water-gas goes away through a seal *n*, to the washer, and thence into another gas holder. This second half of the operation occupies about the same time as that required for bringing the coal to incandescence.

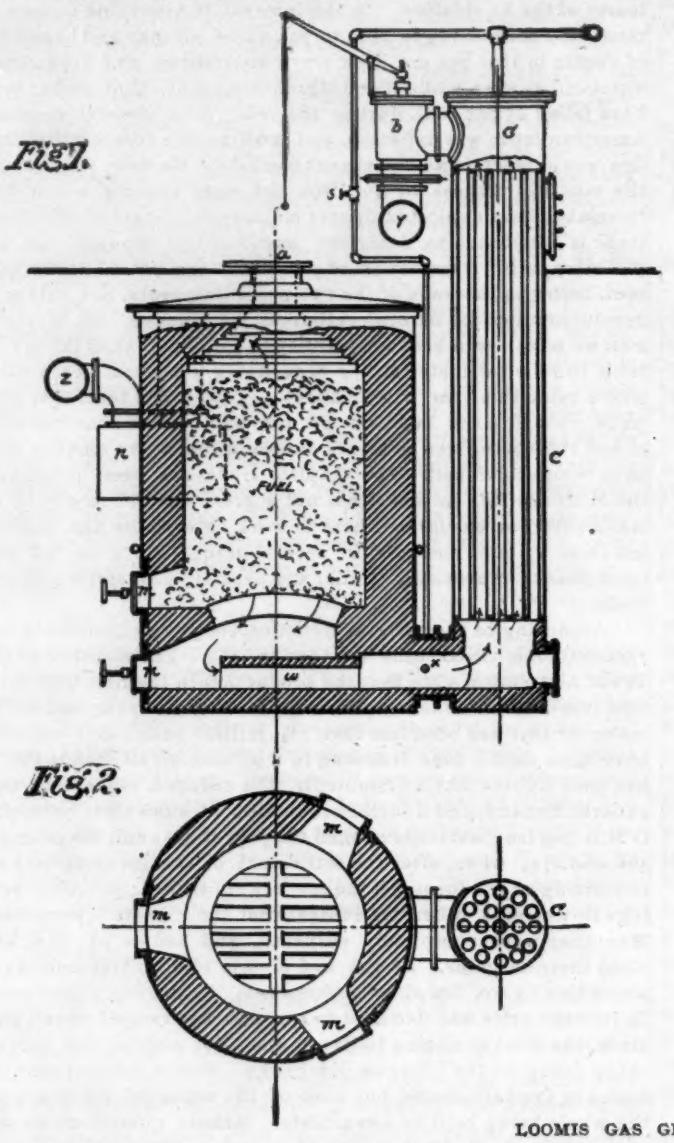
In operating a pair of generators, see plan, Fig. 3, one generator is making producer-gas, while the other is on water-gas, thus keeping a constant flow of both gases. The working of the process is exceedingly easy and simple, no skill being required beyond that which a man of ordinary intelligence and without any previous experience in gas-making, would acquire in a week's practice. The action of the fire is excellent the upper strata of coal coking rapidly, and the whole fire working freely and evenly.

As it is bituminous coal that is generally used in the generator and then coked, the gas thus obtained is of excellent quality; after having passed down through the hot fuel bed it is free from tar, and may readily be conveyed through pipe to any distance required. Instead of making water-gas in every alternate stage for the same length of time as producer-gas, the generator may be worked on producer-gas alone, steam being then admitted at various points while the exhauster is running and the operation of making producer-gas is going on. It is therefore not requisite to alternate the action of the generator so frequently as every four to six minutes; but only so much water-gas need be made as may be called for by the requirements of the work to which the process is applied.

From the gas-holder the gas is supplied under a pressure of two or three inches of water, into the furnaces, the supply being regulated by the ordinary gas-valve; the opportunity given the producer-gas to mix in the holder prevents sudden variations in quality, so that with gas delivered at the furnace uniform and at fixed pressure any desired quality of flame can be maintained, as well as any desired temperature. This producer-gas is now being used successfully for re-heating, annealing and hardening metals; for firing tile and pottery, porcelain, gas-retorts, boilers, etc.; and, where purity of flame is desirable, is of special advantage. When the generator is worked so as to get the largest amount of water-gas possible per ton of coal, the generator-gas produced in bringing the coal to incandescence is equal for fuel purposes to rather more than one-half the coal consumed; that is to say, if one ton of coal is used in the generator to produce 40,000 cubic feet of water-gas, the producer-gas also obtained from that one ton of coal will exceed in value half a ton of coal applied to re-heating, etc. The percentage of combustible matter in the producer-gas ranges from 20 per cent. to 35 per cent., according to the quality of coal used and method of running.

The water-gas made by this process differs from any other water-gas in its peculiar and strong odor, in consequence of which any leaks are readily detected; this is due to the hydro-carbons taken up by the water-gas from the bituminous coal. The calorific power of the gas is thus increased, and in the experience of those who have used water-gas made from anthracite coal, coke, and also from bituminous coal, the gas made from the latter has been found the most suitable for the treatment of steel, having a higher calorific power than when made from either anthracite coal or coke.

As an indication of its merits for heating steel, it has been proved to furnish the best heat for treating watch springs, giving a better quality of springs than can be obtained by the use of any other fuel. It has been in use for nearly three years for this and other purposes at the American Waltham Watch Works, and for a longer period in heating fine steels for forging, hard-



LOOMIS GAS GENERATOR.

ening and tempering in cutlery, file, saw and similar work. The quantity of water-gas produced per ton of coal consumed in the generator ranges from 35,000 to 45,000 cubic feet, some coal yielding more water-gas than others. In respect to stability, the gas is fixed; there is no condensation.

In actual running for one month, using Cumberland coal, gas analyzed daily, and measured with meter, the average smount made per ton of (2,000 lbs.) was 46,000 cubic feet of water-gas with 341 h. u. per foot, making 15,686,000 h. u. in the water-gas. In addition to this the producer-gas was measured and analyzed, and found to contain fully 8,000,000 h. u., making a total of 25,686,000 h. u. from one ton of coal containing 27,000,000 h. u.

Our illustrations show several applications to which this system has been, or may be, put. The interior view (Fig 4) of the fuel-gas plant of the American Tube & Iron Co., is very interesting.

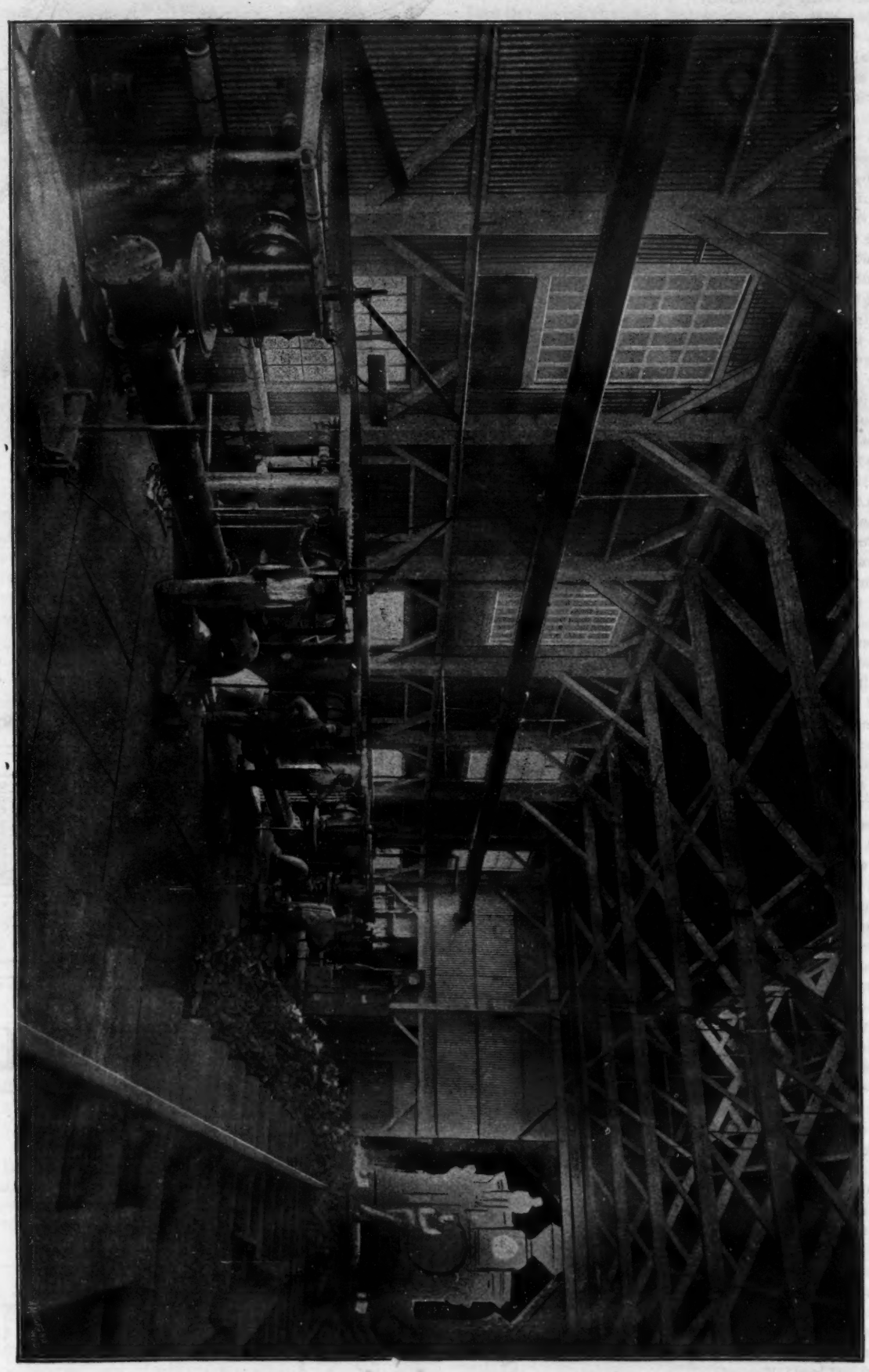


FIG. 4.—INSIDE VIEW OF ONE-HALF OF FUEL-GAS PLANT, AMERICAN TUBE AND IRON CO., MIDDLETOWN, PA. CAPACITY, 3,500,000 C. F. WATER-GAS PER 24 HOURS.

Fig. 5 (page 8) is a double hearth puddling furnace. This furnace is designed so as to give a nearly continuous output. In operating, hearth No. 1 is being worked, and gas burned in it through three or more burners placed near the crown. The passage to the air-heater is closed by a fire brick damper, and the products of combustion are made to pass into hearth No. 2, which has been freshly charged; the products then pass to the air-heater and escape at a low temperature. When hearth No. 1 has been worked out a fresh charge is introduced, the gas shut off, and No. 2 is fired up to working heat, the products passing to No. 1 and to the air-heater from flue No. 1. By this means nearly all the waste heat from the hearth, being worked, is returned to the furnace, the only loss being in radiation and the small amount passing away by the chimney, the temperature of which is very low. The system can also be applied to melting steel in crucibles, reheating steel billets, piled scrap, etc., reheating plates, pipe-welding, tempering, etc. Address Burdette Loomis, Hartford, Conn.

Old Rails for Telegraph Posts.

The Great Indian Peninsular Railway is utilizing its old rails as telegraph posts, and they are cheap and durable, as well as strong and inflexible. An extra piece of rail is bolted to the rail at its lower extremity, generally from four to six feet long for an ordinary telegraph post. Sometimes two pieces are necessary for specially long poles. This end is then buried in the ground, and the pole is ready for its fixings. The cost is about from eight to ten rupees each, as against from at least 20 to 30 rupees for wooden posts, and even more for galvanized iron uprights.—[Railway Review.

Two Significant Facts.

The United States made more pig iron in the single month of October, 1891, under the McKinley tariff, than they made in the whole of 1860, that culminating year of the "growing prosperity" of the "golden era" of low revenue tariff. The United States shipped more breadstuffs, principally wheat, to foreign countries in the single month of September, 1891, under the McKinley tariff, than they sent during the whole of the fiscal year 1860, the last of the prosperous period of our last Free Trade tariff.—[American Economist.

SCIENCE OF TEMPERING STEEL.

J. E. Emerson writes the *Scientific American* as follows:

Some of the very best cast steel made is often condemned by ignorant and careless workmen in both forging and tempering. Take, for example, a mill pick for picking burr millstones, and I have seen blacksmiths, when forging, upset the edges that are to be tempered for cutting these very hard stones, either being ignorant of the structure of forged cast steel or not considering the injury that they were inflicting upon that metal.

When cast steel is melted and cast into ingots, all of the particles are of globular formation (round), and there are open spaces between these diminutive globes. In forging, these globes are elongated and welded more closely together, and pointed at the ends proportionate to the amount of forging or elongating which they receive. If you examine the cutting edge of a razor with a powerful magnifying glass, you discover that the edge is toothed like a fine saw. If in forging that razor the forger hammers the edge, then grinds and finishes it as it is left from the forge, he will find a most irregular toothed razor edge, one tooth flat or blunt and another peaked and sharp, the pointed edge of the very sharp one liable to break off or crumble as he saws off his beard, for that is what the barber does when he shaves you. He saws your beard off. In upsetting the mill pick you blunt up these sharp points and crowd one against another, so that when you harden the point it is very likely to start an invisible crack at the cutting edge which enlarges at each jar from a blow on the stone, and a corner flies off.

And still another ridiculous idea is that it must be hammered off until quite cold, so as to refine the steel. I have found that the very best results come from heating carefully to a good cherry red, forge the tool out when quite red, and cut the end off, and never upset a mill pick or chisel or any cutting tool intended for hard service. In hardening a mill pick or cold chisel, never plunge it into the hardening bath suddenly to a given point, because the shrinkage will be at a fine given point, while the part above is a trifle larger, and a crack is liable to start at this very point. Run the edge or point to be hardened into the bath rather slowly and above where the temper of the tool is needed, and raise it out in the same manner. Wood coal is preferable for heating such tools, because it throws off carbon and contains no sulphur or other base substances injurious to steel. In forging wide cutting tools, hammer the cutting edge last, so as to expand that part a little the most, as this will prevent it cracking at the edge when hardened. In making chopping axes for frozen timber, after they were forged in the regular way under a trip hammer, I always had them carefully hand forged at the cutting edges, and never allowed the smith to upset the cutting edge.

THE result, after something more than a century of trial, has shown the American policy to have been right for American interests, and this has been more especially the case since 1861, when protection took firm hold and was carried out logically and continuously. Pittsburgh formerly took the name of "the Birmingham of America," and up to not long ago its citizens had pride in the cognomen. But within six months Andrew Carnegie, in a speech delivered in Great Britain, stated as plainly as language could express the fact that Pittsburgh was no longer the Birmingham of America, though Birmingham might be called the Pittsburgh of England.—National Labor Tribune.

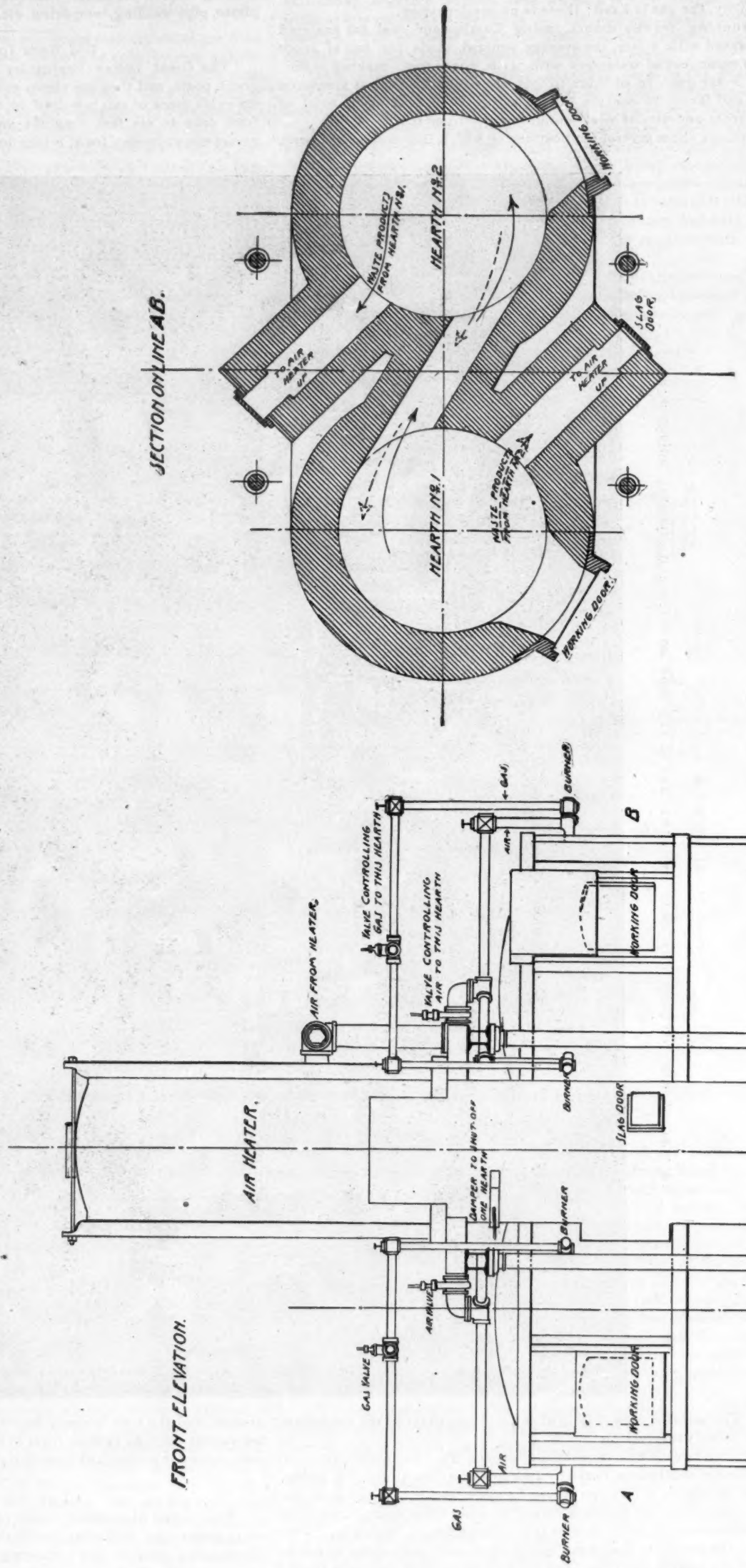


FIG. 5.—DOUBLE-HEARTH PUDDLING FURNACE.—FIRED WITH WATER-GAS AND HOT AIR BLAST.—(See page 7.)

REMARKABLE PERFORMANCE OF AN ENGINE GOVERNOR.

It is commonly believed that certain kinds of work are most severe on an engine, because of the variable character of the load. This is not true, however, to the least degree, since the engine accepts only the reciprocating pressures distributed by its valve, and no change of load can make these changes of pressures more numerous or violent than would occur under constant load. A change to a longer cut-off merely continues the pressures through a greater part of the stroke; while a shorter cut-off has no effect in making the reversal of pressures less sudden at the end of the stroke.

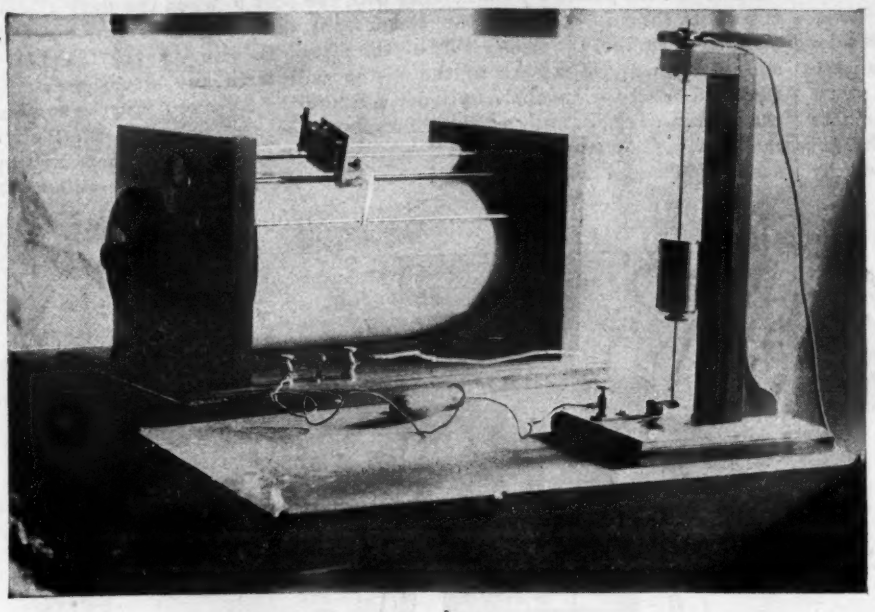


FIG. 1.

The real trouble experienced is an acknowledged inability, in the great majority of governors on the market, to effect a perfect adjustment for quick changes of load without being affected by the violent surging which generally occurs. When subjected to this strain they rapidly deteriorate with their effort to satisfy the demands upon them, while obstructing devices which insure a smooth, easy action of the governor have the very opposite effect upon the engine and the work it does.

Probably the severest duty imposed upon an engine governor is found in electric railway work, where the changes of load are practically instantanous, and often through a wide range, while the character of the service demands a constant speed. It is customary and considered sufficient in such work to measure the speed over a considerable interval of time, and the rate of speed per minute represented as the actual number of revolutions in that time; yet, extreme fluctuations of load might change the speed (even if but momentarily) far above or below this reading without in the least affecting the average.

With a view to thoroughly investigate the efficiency of the Westinghouse compound engine governor in this respect, a supplementary test was made upon an 18 and 30x16 engine of this type at the power house of the Federal Street & Pleasant Valley Electric Street Railway, by C. F. Scott, of the Pittsburgh laboratory of the Westinghouse Electric & Manufacturing Co. A special instrument was designed by Mr. Scott, reading to one-hundredth of one per cent. variation of speed and registering every half second.

Referring to the cut (Fig. 1) the following is a description of the apparatus: A milled center inserted in that of the engine's shaft revolves a large wooden drum (whose circumference is 25 inches) at the same speed of the engine (250 revolutions per minute), while a belted screw feed moves an electro magnet, whose armature supports a pencil, longitudinally along the cylinder. Another part of the apparatus is a pendulum adjusted to beat nearly at the speed of the engine and make electric contact at the center of its motion to operate the armature and pencil upon the drum. A strip of paper stretched upon the drum receives the impressions of the pencil, and when developed displays a line of elongated dots at an angle to the edge of the paper whose inclination varies with the speed. The measured distance, in inches, of two dots that represent four revolutions of the engine, or 100 inches of the drum, is the per cent. of variation of the engine's speed from that of the pendulum; and a plotted series of these measured distances from a base line, shown in Fig. 2, with a connecting line drawn through them, is the record of the governor's performance. A horizontal distance of one small square corresponds to two revolutions of the engine, or an interval of one-half second of time; while a similar vertical distance represents a change of speed of one per cent. The curve above this illustrates the change of load by ampere readings over the same period of time.

It will be seen that the engine changes but one per cent. each side of the neutral line representing the time of vibration of the pendulum through a total change of current equivalent to two-thirds of the rated power of the engine.

Fig. 3 is a similar curve illustrating the action of a governor which depends upon centrifugal force alone for its change of position, as tested by this instrument during moderate changes of load. After each new load the speed changed nearly one per cent. beyond the point at which it should have settled and gradually worked back to the proper place. This governor was perfectly free from obstructing devices; yet, it is indicated plainly that the adjustment did not even commence until the speed had changed considerably. However, this is not surprising when it is considered that it depends on this variation of speed for the force of adjustment. Indeed, the record is not at all a bad one so far as centrifugal governors go, and the extra momentary change of speed would never be noticed in the average service, but it would be wholly unfit for electric railway work.

In their new compound engine governor, the Westinghouse Machine Co. disclaim broadly the originality of the principal of inertia in shaft governing, but insist that they have been the first to so successfully apply the principle, and exhibit in these curves the evidence of the degree of perfection they have secured by the application.

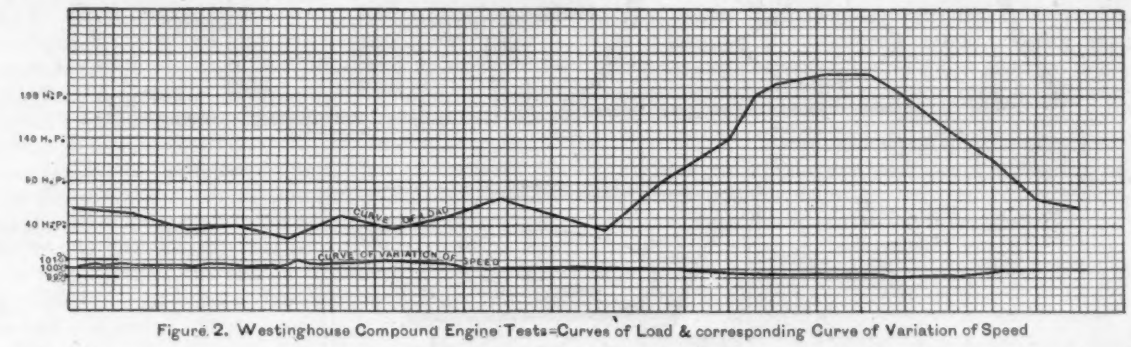


Figure 2. Westinghouse Compound Engine Tests=Curves of Load & corresponding Curve of Variation of Speed

Important Tests of Lubricating Oils.

One of the most important tests generally employed for determining the lubricating quality of oils is the vicosity test, for which several apparatus (notably that by Engler) have been introduced during the last few years. J. Lew, in *Dingler's Polytechnisches Journal*, 1891, points out, however, that although some viscosimeters give satisfactory results in regard to the relative viscosity of a material, they do not determine the absolute lubricating capacity. For this latter a determination of the internal frictional resistance becomes necessary. The internal friction of the lubricating material itself and the external friction of the liquid with solid bodies are the physical properties which influence the frictional resistance of solid bodies with their lubricants. According to Mr. Lew, not sufficient attention has hitherto been paid to the fact that the internal and external frictional resistances are different, and vary in different oils and at different temperatures. He deduces formulæ and describes a method by which these co-efficients may be determined and used with great advantage in the valuation of oils for their lubricating properties. He further gives tables showing the co-efficients of internal friction of different oils at ordinary temperatures, and the changes which oils undergo in regard to these factors with varying temperatures.

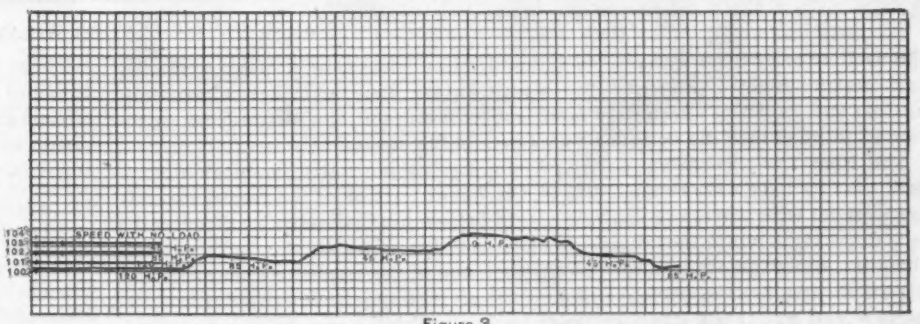


Figure 3.
Curve illustrating variations of Speed in Steam Engines whose governors are actuated by Centrifugal force alone.

Is Iron Rust a Cause of Fire?

When oxide of iron is placed in contact with timber excluded from the atmosphere, and aided by a slightly increased temperature, the oxide will part with its oxygen, and is converted into very finely divided particles of metallic iron having such an affinity for oxygen that, when afterwards exposed to the action of the atmosphere from any cause, oxygen is so rapidly absorbed that these particles become suddenly red-hot, and if in sufficient quantity will produce a temperature far beyond the ignition point of dry timber. Wherever iron pipes are employed for the circulation of any heated medium, whether hot water, hot air or steam, and the pipes are allowed to become rusty, in close contact with timber, it is only necessary to suppose that under these circumstances the particles of metallic iron become exposed to the action of the atmosphere—and this may occur from the mere expansion or contraction of the pipes—in order to account for many of the fires which periodically take place at the commencement of the Winter season.

FIG. 5.—DOUBLE-HEARTH PUDDLING FURNACE.—FIRED WITH WATER-GAS AND HOT AIR BLAST.—(See page 7.)

A NOVEL OSCILLATING STEAM-ENGINE.

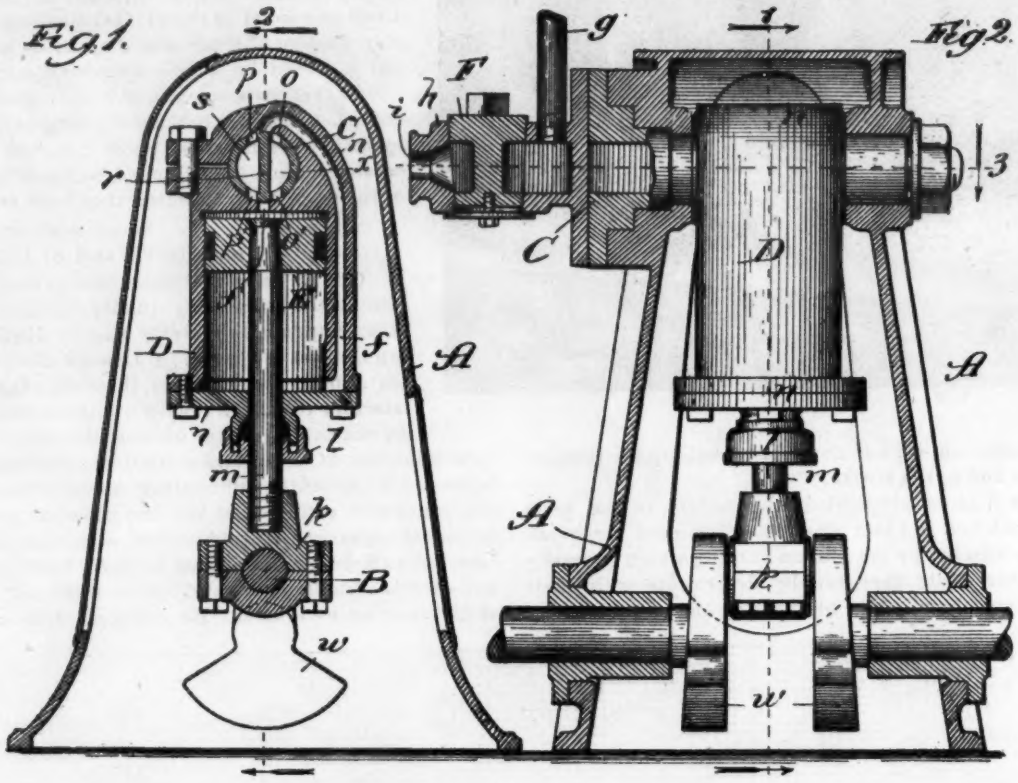
William Thomas, of Ovington, Ill., was granted (December 1, 1891) a patent on a novel oscillating engine, herewith shown:

In the accompanying cuts, Fig. 1 is a sectional view, taken on the line 1 1 of Fig. 2 and regarded in the direction indicated by the arrows, of the single form of my improved oscillating reversible valveless steam engine. Fig. 2 is a similar view of the same, the section being taken at the line 2 2 on Fig. 1 and regarded in the direction indicated by the arrows, with the cylinder represented in elevation. Fig. 3 is a sectional plan view of the same, taken on the line 3 3 of Fig. 2 and regarded in the direction indicated by the arrows.

The principle involved in this engine is that of having the steam-cylinder or any desired number of such cylinders, each provided with two steam-passages leading, respectively, to opposite sides of the piston, connected at its piston-rod with a crank on the shaft to be driven and suspended to oscillate on a stationary hollow pin, forming the steam-chest, divided by a diaphragm longitudinally into two chambers, each provided with two ports, caused by the oscillations of the cylinder to coincide simultaneously in pairs with the said steam-passages, whereby the steam enters each cylinder alternately against and exhausts alternately from opposite sides of the piston from ports caused to open into the cylinder by its oscillating movements.

A, Figs. 1 to 3, is the supporting frame, having journaled in suitable bearings near its base a crank-shaft B. In the upper portion of the frame, extending parallel with the crank-shaft, is a rigid hollow pin C, divided longitudinally by a diaphragm *r* into two chambers *s* and *x*, either of which affords the steam-chamber, while the other is for the exhaust, and at the opposite upper sides of the diaphragm are the ports *p* and *o*, while at its opposite lower sides are the ports *p'* and *o'*. D is a steam-cylinder having a thick upper head *n*, provided with a cylindrical transverse opening in which the pin C fits snugly. E is the piston, the rod *m* of which passes through the cylinder-head *n'*, (where a suitable stuffing-box *l* is provided, as indicated,) and is connected by a yoke *k* with the crank on the shaft B, the crank also carrying a counter-weight *w* for the cylinder. At one end of the hollow pin C (the opposite end being closed) is a head *h*, having at its outer extremity a steam-supply passage *i*, from near which extends branch passages *i'* and i^2, respectively, into the chambers *s* and *x*, and *g* is the exhaust-pipe leading transversely from near the center of the head *h*, where a short passage i^3 branches from it into a chamber containing a four-way throttle F. A steam-duct *f* leads from the cylindrical opening in the cylinder-head *n*, housing the hollow pin C, and from a point above the diaphragm *r* down through the wall of the cylinder D into the latter below the limit of the downstroke of the piston E. A verticaliy-short duct *f'* extends from below the pin C into the cylinder D above the piston therein.

The operation is as follows: With the four-way throttle F turned to the position most clearly represented in Fig. 3, steam is entering the steam-chest chamber *s*, the duct *f'* then eventually (when the crank is moved beyond the center) coinciding with the port *p'*, the ports *p* and *o'* being closed by the head *n*, and the passage *f* coinciding with the port *o* when the duct *f'* coincides with the port *p'*. Then the steam from the chamber *s* will enter the cylinder D against the upper side of the piston therein, driving the shaft B, and the downward stroke of the piston will force any steam previously admitted behind it out of the cylinder through the passage *f* into the exhaust-chamber *x*, whence it will escape through the passage i^2 and throttle F out of the pipe *g*. The movement thus described throws the crank-shaft half-way around beyond a dead-center, and the completion of its throw oscillates the cylinder D back, bringing the duct *f'* to the port *o'*, leading into the exhaust chamber *x*, the port *p* leading from the steam-chamber to the passage *f* and effecting closure of the ports *o* and *p'*, whereby the steam enters below the piston and that above it is exhausted. Thus the oscillations of the cylinder D continue and rotate the crank-shaft.

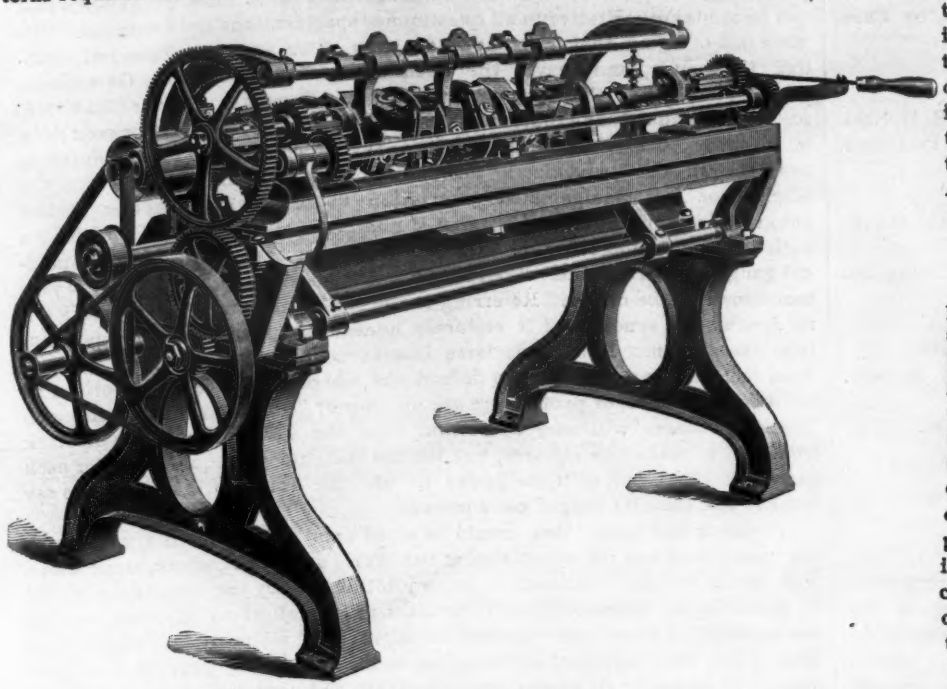


Savernac Steel & Tinplate Company.

At a meeting held in Washington, D. C., the organization of the Savernac Steel & Tinplate Co., of Virginia, was perfected. The capital stock of the company is $2,000,000, and it is backed by some of the strongest men in the State of Virginia, as well as a number of prominent Philadelphia capitalists The officers of the company are: President, T. S. Emery, Philadelphia; Vice-President and General Manager, Thomas Dunlap, Savernac, Va.; Treasurer, Ashton Stark, Richmond, Va.; Secretary, L. W. Marge, Richmond, Va; Tinplate Works Manager, Wilkins Trick, formerly of Swansea, Wales. There is also a London directory, composed of Lord Henry Brudenall Bruce, M. P.; C. W. M. Wilson and Samuel Saddington. The property acquired in the consolidation includes a belt of 4,000 acres of steel producing land on the James river. It is stated that the company will soon commence the erection of tinplate works, with a capacity of 600 boxes per day. They expect to have those works in operation at an early date.

THE OBER LATHE AND SANDING MACHINE.

The Ober lathe, illustration of which we present herewith, is made to turn handles for hammers, hatchets, picks, augers, files, knifes, etc., and yokes, spokes, whiffletress, stair balusters and in fact work of almost any shape, be it round, oval or square, and it will turn off end of the work one shape and the other end an entirely different shape at the same time. It will turn 300 hammer handles, 150 hatchet handles or sledge handles, 60 whiffletress or yokes every hour in the day. It will turn the eye of any handle to fit the tool, and turns the work so smooth that but little sanding is required. The only patterns required are made of wood about an inch thick, the shape of the ends of



THE OBER LATHE.

the article to be turned, and can be made in a few minutes and at a trifling expense. The lathe is provided with adjustable back rests, which hold the stick in place while being turned, and part of the heads are supplied with rings which prevent the knives from cutting too fast or gauging the work. The lathe is made in three sizes, to turn 20 inches, 30 inches, and 42 inches, the weight being from 600 to 1,600 lbs. according to the size.

The Ober sanding machine (cut herewith) is so well shown that it scarcely needs describing. The pulleys for the sand belts are 16″ in diameter and 8″ face. The tight and loose pulleys 6″ diameter and 4½″ face and should run about 1,200 revolutions per minute. It is provided with a spring and treadle, so the operator can press the work on the belt with his foot, thereby saving much hard work for the hands and arms. The spring is adjustable on the frame so the work can be pressed on the belt in different places as the operator may wish, or it can be removed from the machine. The belt is tightened by the hand-wheel and screw. It is very simple, strong and durable and occupies a space of about 2 feet 6 inches by 4 feet. Weight about 600 lbs. For further particulars, address the Ober Lathe Co., Chagrin Falls, O.

PRIMITIVE IRONMAKING IN MEXICO.

In these days, when our bar-iron manufacturers are unable to obtain two cents per pound for their products, and are exercising all the ingenuity of their active brains to make expenses out of the prices they receive, it may interest them to know that competitors of theirs on this continent are unconcernedly jogging along and marketing their bars at more than fourfold greater prices, or for nine cents per pound. These competitors do not use up their income in experiments with different kinds of fuel, nor do they lie awake o'nights trying to devise machinery which will increase the output of their plants with the same labor; but they reverently pursue the methods taught them by their fathers as far back as tradition goeth. That great iconoclast, the railroad, has not yet reached these contented ironmakers, to destroy their faith in the wisdom of their forefathers or to press upon them the need of economies which they have never seen practiced.

We refer to the Catalan forgemasters, who in this country are scarcely known outside of the pages of history; even in the mountain fastnesses of Tennessee they have succumbed to the competition which modern invention has forced upon them. But in Mexico they yet flourish in some degree, as several forges of the Catalan type are still operated in that country. Mr. E. V. Wilkes, of Oaxaca, informs us that four of these forges are situated in the State of Oaxaca, which is next to the most southern of the Mexican States and borders on the Gulf of Tehuantepec. The religious spirit of the owners of these forges is shown in the names given to the works; for instance, one forge is called San Rafael, another Santa Esteben, and another La Providencia.

Our correspondent states that these forges are of the most primitive Catalan type, using a water-blast and having hammers of the crudest form. The master workmen are brought from Catalonia, the province in Spain from which the word Catalan is derived, and where it is supposed the method of ironmaking which the word describes was first introduced into Europe.

The equipments of each of the forges in Oaxaca consists of from two to three fires and from one to three hammers. Their annual capacity varies from 300 to 400 tons of bar iron. The bars are usually hammered to two inches in width by one-half inch in thickness, although some round and square bars are also made. At two of the forges the ore used is a 55-per-cent. hematite, and about 250 bushels of charcoal are consumed in producing a ton of iron. The charcoal costs at these forges 12½ cents a bushel. At the other two forges magnetic ore, containing about 70 per cent. of iron, and hematite ore, containing 50 per cent., are used. The latter forges consume 200 bushels of charcoal to the ton of iron, the charcoal costing only 6¼ cents per bushel. The ordinary laborers at all these little works are paid from 25 cents to 31 cents per day. The iron, as we have stated above, sells for nine cents a pound.

Mexican, American, and European rolled bars are sold at Oaxaca for twelve cents per pound, which price leaves a comfortable margin in favor of the local producers. A railroad, however, is projected to Oaxaca, which when completed will cheapen freights and cut down the profits, large or small, of the local forgemaster. Then, in due season, the Catalan forge of Mexico will be numbered among the things which have served their time, and must give place to those which can better meet modern wants.—[Bulletin of the American and Steel Association.

A Compact Power Plant.

The Harvey Land Association have just completed a very neat plant at the town of Harvey, Ill. The waterworks, electric light and street railway plant are combined in one. For the waterworks two Worthington duplex pumps, each having a capacity of 1,000,000 gallons per 24 hours, are used. The standpipe is 16 feet in diameter, 120 feet high, and has a capacity of 200,000 gallons. They have at present 10 miles of main pipe laid. For the electric light and street railway plant two 14x16 Ide ideal engines supply the power, one of them running the dynamos for the street railway and the other for the electric light. For the street railway plant a multipolar compound wound dynamo is used, one peculiarity of which is that the armature is made in 35 or 40 sections, any one of which can at any time be removed and repaired without disturbing the others. The steam is supplied for both the engines and pumps by two 60-inch by 16 feet tubular boilers. The smokestack is carried up at the side of and fastened to the standpipe, which saves the expense of making an additional support for the stack. The street railway cars are fitted up by the Short gearless system. At present the cars supplied are running with gears, but are so constructed that the dynamos can be removed at any time and the gearless system put on without changing the truck. The cars are very commodious, being 31 feet long, and will seat 70 people. The platforms are fitted with vestibules with a swell dash, which makes a very neat finish. The rheostat is placed under the center of the car, leaving the platform perfectly clear.—[Railway Review.

Accumulation of Electricity by Gravity.

It is reported that the Northern Railway Co. of France will make experi-

THE OBER SANDING MACHINE.

ments with an electric locomotive on their line from Paris to St. Denis. On this line the trip in one direction being all down grade, does not require the use of a locomotive. The experiments are being made with a view of being able to keep the motors in motion on the down grade and restore to the batteries a portion of the power generated by the gravity of the train, thus saving a great amount of energy which under ordinary circumstances would be entirely lost.

LOCOMOTIVE engines to the value of more than $2,000,000 were exported from the United States during the last two months, showing a rapid increase in the foreign demand.

NO POOL FORMED.

IRON AND STEEL ROOFERS IN ANNUAL SESSION.

Full Proceedings of the National Association at Canton, O.—Fixing Prices—A National Gauge—Selling to Brokers—New Officers.

The annual meeting of the National Iron Roofing Association commenced at Canton, O., Wednesday, January 13th, in the City Hall building. The meeting commenced at ten o'clock and was called to order by President Aldrich, after which the roll was called by Secretary Hyndman. The following firms were represented:

The Missouri Iron Roofing & Corrugating Co., of St. Louis, by Chas. Aldrich, President.

W. G. Hyndman & Co., of Cincinnati, by R. J. Hyndman.

Jas. A. Miller & Bros., of Chicago, by Jas. A. Miller.

The Indianapolis Iron & Steel Roofing Co., of Indianapolis, by S. D. Noel.

The Canton Steel Roofing Co., of Canton, O., by Col. T. C. Snyder, President, and Harry P. Ball, Secretary.

J. Heller & Co., of Canton, by J. Heller.

Berger Manufacturing Co., of Canton, by J. A. Berger and E A. Langenbach.

The Wheeling Corrugating Co., of Wheeling, W. Va., by E. C. Ewing and Alex. Glass.

Aetna Iron Works, of Bridgeport, O, by John A. Hopplling.

Clark, Quien & Morse, of Peoria, Ill., by Chas. D. Clark, President.

Kanneberg Roofing Co., of Canton, by A. C. Kanneberg and W. A. Jackson.

W. A. List & Co., of Wheeling, W. Va., by W. A. List.

Garry Iron & Steel Roofing Co., of Cleveland, by Geo. E. Needham.

Heberling Metal Roofing Co., of Havana, Ill., by W. L. Heberling.

Chas. H. Connor of Louisville, Ky.

Scottdale Iron Co., Scottdale, Pa., by C. Grazier, Secretary.

Acme Roofing Co., of Canton, O., by —— Laurens.

E. E. Souther & Bro., of St. Louis, Mo.

Letters were then read by the Secretary from the following concerns expressing their desire to be at the meeting and to become members of the Association. Holton Iron Roofing Co., New Lisbon, O.; N. H Haldeman & Co., Philadelphia, Pa.; and M. H. Crittenden & Son, of Minneapolis Minn. Letters of regret from members of the Association who were unable to be present were also read.

The minutes of the previous meeting were then read and accepted and were followed by President Aldrich's report:

PRESIDENT'S ADDRESS.

GENTLEMEN.—This, the sixth annual meeting of the National Iron Roofing Association finds it with a longer list of members than ever before, a better general feeling among its members and a strong desire among its officers to make it a success. The business of the past year has been in the hands of the Executive Committee, and you will learn of its labors from the report of its chairman, Mr. Connor. There have been several matters taken up, on some of which you will be asked to place your sanction, and others that are still subjects of discussion. Early in last year your President asked each member for an estimate of the amount of iron handled by his house during 1890. The information was requested that it might be used in advancing the interests of the Association in the matter of freights. The response was general, and from the replies it was found that about 20 of the members in 1890 had used about 35,000 tons of sheet iron. The iron in most cases paid two freights, from the mill to the manufacturer and thence to the jobber or consumer. That makes 70,000 tons handled, and allowing for the amount used by non-members, for the paints, oils, ores, lumber, etc., it is unquestioned that our trade patronizes the railroads to the extent of over 100,000 tons per annum. This large tonnage, handled as it is by forty or fifty concerns, shows the volume of our dealings with the railroads, and the right it gives us to ask them for concessions in our favor.

There is one thing that, small in a single shipment, is of greater importance to us as a whole. It is the question of charging extra class rates on nails, ores, wood-filler, V sticks, etc.; which are shipped with roofing. This question has been taken up in a shipment by my own company into the Rocky Mountain territory, and ably handled by our customer, but without avail. I expected to bring it up at the meeting of the Classification Committee, in Chicago, on November 5th, 1891, but after preparing my papers and arranging for the trip, found that under a new resolution all petitions must be filed ten days before the meeting and that no personal appearance of petitioners was allowed. It was a new rule to me, and I did not hear of it until too late and was not able to bring it up. In the case above mentioned, Mr. Ripley, chairman, ruled that as nails and dry paint could be used for other than roofing purposes they should not go in carloads at the carload rate, but rather at their own class car rates. It was strongly urged that this rule could not apply to cleats, roll caps, V sticks, etc., but the decision was against our customer.

The Transcontinental Association has recognized to a certain extent the justice of this claim, for, in their commodity rates to the Pacific Coast, they class iron roofing carloads at, say, $1.10 per cwt., and then say including nails and wood strips necessary, same rate; and now the Western Association has also made slight concessions in their new classifications, taking effect July 1st, 1892. They quote iron roofing, not otherwise specified, including wood cleats for same, etc. It is just and right that not only in carloads, but also in small shipments our boxes of ore, paint, cleats and nails and V sticks, in fact, all parts of a roofing and siding should take the same rate as one and the same shipment.

It is no argument to say that this cannot be granted because some shippers would abuse the right. I would suggest that this matter be brought again to the attention of the chairmen of the different classification committees, and if unsuccessful, then before the different committees at their Spring meetings.

Among the suggestions submitted to me was the correct weights of the different gauges for 100 square feet. This matter will be presented to you in the report of the Executive Committee. At a meeting held in Put-in-Bay the question of weights of galvanized iron was brought up, and the report of the committee on that subject will be read in due time. It is advisable that this question of gauges be taken up. It is known that in the Fall of 1890, a few of the members attempted to get a statement from the United States Treasury Department of the gauge used by the different customs officers in appraising and levying duties on imported sheet iron. The use of iron for building purposes is growing so rapidly that we should have a national gauge—one that can be made authoritative in all questions of specifications and contracts. The mere fact of saying that iron is to be 20, 22 or 24 or any gauge does not establish the gauge, and leaves the question open to trickery. Galvanizers have just changed their gauge weights on all gauges heavier than No. 20, and I understand that the sheet mills are to form an organization in the near future. I would suggest that a committee be appointed to confer with the galvanizers and the sheet mill men, and with the officials of the amalgamated association to bring this question before Congress in proper form and see that if a bill cannot be passed establishing a national gauge on sheet iron. Until this question is settled we have a standard gauge for our own use, endorsed by this Association, and during this year sanctioned by the courts. Referring to the case of Wheeling Corrugating Co. *vs.* Specht, this sanction of it endorses honest compliance with the gauge of this Association. It also declares inferentially against dishonest gauges. This decision cannot be used to defend the use of .56 for .64, or American 26 for Birmingham 26, or protect the use of "our 27" when it is not the Association 27. Squares will vary somewhat from the different quantity of black iron used to make the squares, but let the weights per square foot for each gauge be the same, or if we prefer to use the American gauge let us say frankly and state its weight per square.

There is one matter that should be acted upon at this meeting, and that is the question of our representation at the World's Fair. It seems to me that a joint space for our Association and a joint display by the Association would be better for all concerned than individual efforts, all of us together bearing the expense. The earnest endeavor to improve the status of the trade rather than of any one individual will help the members more by general advertisement, and be better all around, than the labor and expense caused by personal efforts to have one display the best. I would suggest a World's Fair committee of seven, who shall procure the space and make necessary arrangements.

Among other suggestions received by me is one that we adopt a heavier gauge as the standard. This is important, and should receive our careful consideration. Attention is also called to the fact that in the face of one of the best rules of this Association, some of the members are advertising that they give nails and paint without charge. This should not be. Another suggestion is that in regard to quoting prices at the location of a fellow member. This is also worthy of our consideration. It is also suggested that we make a revision of all rules, weights, measures, etc., and have them printed in a little pamphlet for distribution, as the official rules, tables, etc. This is a wise plan and should be carried out.

From my own knowledge of the business I assert that at least 50,000 tons of sheet iron, 20 to 28 Birmingham gauge, were converted into building material of our class, last year. Take that in 26 as an average, 1,250,000 squares at say, $2.80 per square, and that is very low, will equal $3,500,000.00 output. Such a business, handled as it is by 40 or 50 firms, demands consideration and thought. Our best efforts should be devoted to smoothing away differences, and to allaying jealousies. Output will vary according location, territorial demand and means of manufacture. We should expend more money to increase the interest in and extend the value of our Association.

There are other things of value to us than an agreed an arbitrary price. The Executive Committee do not think that feasible at present. I have outlined several matters of importance to the trade and to the Association, and trust that suggestions will cause dicussion, and that members of greater experience than myself will give us the benefit of their views on these and other subjects, so that no longer the manufacturers outside of the Association can say, "Of what good is the Association." The more value it is to the trade, the longer will be its membership, the stronger its influence and more rapidly will draw near the time we all desire when our trade shall be free from distrust and jealousy; when greater confidence shall exist among the members, and when all will look to the Association to correct abuses, to strengthen the ties of friendship, and place our business as one of the prominent lines of trade in this country. Let us strive to make this, the sixth annual meeting, the birth-place of new, stronger and healthier impulses to the National Iron Roofing Association. Thanking you for the kind attention you have given me, and bespeaking your indulgence as your presiding officer, I await your further pleasure.

After the President's report had been read, the reports of the various committees, the Secretary and the Chairman of the Executive Committee were listened to.

A scale of amended weights for painted roofing was then brought up and referred to a committee for action, as well as a table of weights of corrugated and other galvanized iron roofing.

An invitation was extended by President Snyder, of the Canton Steel Roofing Co., to visit the works of that concern at 3 P. M., Thursday, and it was unanimously accepted.

The Convention then adjourned to meet at 2:30 P. M.

WEDNESDAY—AFTERNOON SESSION.

The second session was called to order at 2:45 P. M., and the following resolutions were introduced and passed:

That the matter of extra freight rates on iron roofing, trimmings, etc., be referred to the Committee on Freights.

That a World's Fair Committee be appointed to consist of the five members of the Executive Committee and two others, one of them to reside in Chicago, for the pupose of making arrangements for a joint display of their best products.

That this association shall continue to be governed by Birmingham gauges given in Haswell's Engineering book, and hereafter shall dispense with the words "Standard Roofing Gauge," and when no other gauge is specified in orders, that No. 27 be shipped.

That when inquiries are received from localities in which fellow members are situated, such inquiries shall be referred to them.

That a revision of all rules, tables, weights, measures, etc., be made and printed in suitable form for distribution by members when desired as the official rules, tables, etc.

That it is advisable to have the question of guages taken up, and that we confer with the galvanized iron and sheet mill men, and the Amalgamated Association of Iron Workers, to establish a national guage.

That all packages sent out be labeled or stamped with the gauge, weight and character of the goods therein.

The Association then adjourned to meet at nine A. M. Thursday.

SUMMARY OF THURSDAY'S PROCEEDINGS.

BY TELEGRAM TO THE IRON TRADE REVIEW.

CANTON, O., Jan. 14, 1892.

The second day's session convened at 9:15 A. M.

The question of weights of galvanized iron roofing was brought up, and it was resolved that the following weights be adopted as approximate weights for 28-inch sheets, with 2½ corrugation: No 28, 87 lbs; No. 27, 94 lbs; No. 26, 101 lbs; No. 24, 114 lbs; No. 22, 141 lbs; No. 20, 188 lbs; No. 18, 221 lbs; No. 16, 287 lbs.

It was further resolved that the approximate weights of painted galvanized iron corrugated and other roofing be as follows: No. 27, 72 lbs; No. 26, 81 lbs; No. 24, 98 lbs; No. 22, 123 lbs; No. 20, 153 lbs; No. 48, 214 lbs; No. 16, 283 lbs.

It was resolved that a committee on membership be appointed to consist of W. A. List, H. B. Heberling and A. D. Woods.

The next annual meeting will be at Wheeling, W. Va., on the second Wednesday of January, 1893. In pursuance to invitation extended by firms located there, the next semi-annual meeting will be held next July at Lakewood, N. Y.

The matter of selling the products of members through brokers was brought up for discussion, and it was resolved that questions of differences involving patents in interests be settled by arbitration.

A ballot was then taken for the election of officers for the ensuing year, resulting in the election of the following: J. G. Battelle, President: Chas. H. Conner, Vice-President; R. J. Hyndman, Secretary and Treasurer.

A vote of thanks was extended retiring officers and committees for services the past year, and the association adjourned.

OHIO MINING ENGINEERS.

The twelfth annual meeting of the Ohio Institute of Mining Engineers will be held in Celtic Hall, S. W. corner of Chestnut and Fourth streets, Columbus, O., January 21st and 22nd, 1892. The programme includes the annual address of the President, Hon. Anthony Howells, Massilon, O; a paper, "Comparison of the Composition of Certain Coals with their Evaporating Powers in Locomotive Boilers," by Prof. N. W. Lord, O. S. U., Columbus, O.; a paper, "The Necessity of Making Break-throughs Even and Uniform at the Mines," James W. Haughee, Ex Dist. Mine Insp., Nelsonville, O; a paper, "Mining Limestone by Underground Instead of Open Quarry Work," E. B. Willard, Mine Supt., Hanging Rock, O.; a paper, "The Harrison County Oil Fields," Wm. B. Hanlon, Chief Eng. C., L. & W. R. R., New Philadelphia, O.; and a paper, "The Use of the Prismatic Compass in Mine Surveying," E. D Wileman, C. & M. E., Massillon, O.

Friday afternoon will be devoted to visiting points of interest. First a visit will be made to the Jeffrey Manufacturing Co., where both electric and air mining machines and air drills will be on exhibition. If it is not too late on the return a visit will be paid to the Lechner Electric Machine Works. In the evening the following papers will be read: "The Coal Seams of Jackson County," by Hon. Andrew Roy, Mining Geologist, Glen Roy, O.; "Split Air Courses vs. Continuous Currents," by Prof. F. W. Sperr, O. S. U., Columbus, O.; "The Original Members of the Institute," by Capt. J. L. Morris, Canal Dover, O.; "The Wasteful Methods being Practiced in Mining Coal in Ohio," by R. M. Haseltine, Chief Insp'r of Mines, Columbus, O.

Water-Gas in Iron and Steel-Making.

In regard to the Loomis process of making fuel gas, described in another column, we learn from Mr. B. Loomis, the inventor, the following interesting facts regarding its use in iron and steel-making. Mr. Loomis writes: "In melting steel we get easily six heats in 24 hours, and the water-gas from 500 lbs. of coal will make a ton of steel. In the puddling we get great results, as we get a superior product and more easily handled, and the water-gas from 600 lbs. of coal will puddle one ton of iron."

FROM ALL THE MINES.

COMPLETE SUMMARY OF IRON ORE SHIPMENTS IN 1891.

Figures Showing the Total Shipments from Lake Superior Mines for 1891 by Lake and Rail.

The current issue of *Iron Ore*, Ishpeming, Mich., contains the first complete statement showing shipments by lake and rail from all the Lake Superior iron mines for 1891. We append the table hereto:

Marquette Range.	From Escanaba	From M'rqu'tte	From Ashland.	From Two Hbrs	From Gladst'ne	By All Rail.	Total Tons.
American	2,749					19,125	21,604
Angeline	59,643	155,368				26,594	241,605
Buffalo	333,725	108,997				36,787	479,509
Cambria	24,935					9,727	34,662
Champion	3,747	129,666					133,413
Cleveland	104,371	74,039				43,378	221,788
Iron Cliffs Co.	192,250	60,620				25,400	278,270
Cheshire	7,301						7,301
Dexter		1,133				4,315	5,448
East New York	36,001	9,061				5,231	50,293
Fitch	155					14,938	15,093
Grand Rapids	2,528	1,775				5,059	9,362
Humboldt		19,879					19,879
Imperial		10,440				8,112	18,552
Jackson	73,084	19,162				733	92,979
Lake Superior	195,369	109,807				3,655	308,831
Lillie	4,271					15,280	19,551
Lucy	12,664					15,019	27,683
Marquette	3,561	7,005				6,236	16,802
Michigamme	8,556	13,554				1,059	23,169
Negaunee	30,348	33,870					64,218
Prout	4,412						4,412
Republic		156,147				34,980	191,127
Riverside						6,783	6,783
Saginaw		1,969				2,351	4,320
Volunteer	35,321	57,286				92	92,699
Winthrop	19,924	86,249				15,869	122,042
Total	1,056,027	1,036,148				300,723	2,511,395
Menominee Range.							
Aragon	62,689					34,140	96,829
Beta	1,400						1,400
Chapin	428,504					60,245	488,749
Commonwealth	133,182					1,800	134,982
Cyclops	10,599						10,599
Dunn	161,932					789	162,721
Great Western	62,464						62,464
Florence	48,806						48,806
Groveland						1,049	1,049
Hollister	1,057						1,057
Hamilton	12,553					45,644	58,197
Hemlock	11,610					23,921	35,531
Millie	5,889						5,889
Iron River	59,345						59,345
Ludington					132,222	9,081	141,303
Mansfield	25,754					24,082	49,836
Monitor	26,226						26,226
Mastodon	45,370						45,370
Nanaimo	11,000					2,200	13,200
Norway	4,089						4,089
Paint River	38,146					7,289	45,435
Pewabic	64,507						64,507
Shafer	70,470					300	70,770
Sheridan	6,637					500	7,137
Vulcan	78,967						78,967
Walpole	2,853					1,042	3,895
Youngstown	3,705						3,705
Lincoln	1,813						1,813
Curry	100,681						100,681
Total	1,480,248				132,222	212,082	1,824,552
Gogebic Range.							
Ashland			250,925			16,514	267,439
Aurora			82,624			928	83,554
Brotherton	33,614					12,960	46,574
Carey	9,442		99,224			12,520	121,186
Eureka			12,740			1,167	13,907
Federal						6,778	6,778
Germania			32,000				32,000
Iron Belt			1,506				1,506
Montreal			56,133				56,133
Mount Hope	1,526		104,081				105,607
Norrie	337,608		357,438			63,526	758,572
Pabst	41,507		84,532			4,187	130,226
Palms			32,227				32,227
Ruby			913				913
Sunday Lake			54,419			10,493	64,902
Sec. 33 Bessemer			38,576				38,576
Tilden No. 1			23,194				23,194
Tilden No. 2			5,221				5,221
Comet			10,144				10,144
Colby						9,619	9,619
Hennepin			15,759				15,759
Atlantic							
Superior						10,710	10,710
Total	423,697		1,261,658			149,392	1,834,747
Vermilion Range.							
Minnesota Iron Co.				517,570			517,570
Chandler				372,729		1,240	373,969
Total				890,299		1,240	891,539

RECAPITULATION.

ORE BY RANGES:

From Marquette	2,511,395
From Menominee	1,824,552
From Gogebic	1,834,747
From Vermilion	891,539
Total tons	7,062,233

BY PORTS:

From Escanaba	3,058,590
From Marquette	1,056,027
From Ashland	1,261,658
From Two Harbors	890,299
From Gladstone	132,222
By All-Rail	663,437
Total tons	7,062,233

Compared with the shipments of 1890, there was a falling off in 1891 of 1,961,347 gross tons. Of this shortage Marquette district is credited with 502,148 tons; Menominee with 457,685 tons; Gogebic with 1 013,039 tons. Vermilion shows a gain of 10,285 tons. The shrinkage of the Gogebic product is very great, there being a general retrenchment all along the line. The Colby, formerly one of the big shippers, sent out but a few thousand tons last season, and has a stockpile of over 100,000 tons.

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INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Chicago, Ill.—The Ac Mite Manufacturing Co.; capital, $100,000; for the manufacture of ac-mite in all its different forms; incorporators: Chas. B. Graham, S. A. Johnson, Thomas Clark.

Chicago, Ill.—Chicago Humane Fence Co.; capital, $60,000; to manufacture, buy, sell and deal in wire fence and various specialties; incorporators: Oliver Colborne, A. B. Bacon, J. K. Wilson.

Morrison, Ill.—The Whiteside Manufacturing Co.; capital, $5,000; to manufacture and sell articles made of wood or metal, or both; incorporators: H. S. Green, William High, George H. Brown.

Chicago, Ill.—The Hill Double Lock Safety Switch Co.; capital, $250,000; for the manufacture and sale of railway and other supplies; incorporators: John J. Hill, Wm. H. M. Hill, D. H. Curtis.

Lansing, Mich.—The Oviatt Wagon Co.; capital, $20,000; for the manufacture and sale of wagons, carriages and sleighs; incorporators: Jas. J. Baird, S. E. Oviatt, E. P. Oviatt, all of Lansing, Mich.

Manitowoc, Wis.—The Sercombe & Balle Manufacturing Co.; capital, $100,000; for the purpose of manufacturing, buying, selling and dealing in bicycles; incorporators: P. H. Sercombe, F. H. Ball, N. G. Unanwood.

Jacobus, Pa.—The Success Wire & Hedge Fence Co.; capital, $10,000; for the purpose of manufacturing wire and hedge fence; incorporators: Pius Snyder, Isaac Hovis, both of Jacobus, Pa.; Harris Lentz, Glatfelters, Pa.

Scranton, Pa.—The Scranton Supply & Machinery Co.; capital, $50,000 for the sale and manufacture of mining machinery and supplies; incorporators: Wm. H. Taylor, H. W. Kingsbury, F. S. Barker, Wm. Boyd, Jr., Geo. W. Deeths.

Cleveland, O.—The Jacob Hoffman Wagon Co.; capital, $50,000; for the purpose of manufacturing and dealing in wagons, carriages and vehicles, etc.; incorporators: Jacob Hoffman, A. H. Hoffman, A. M. Hoffman, Edward C. Hoffman, M. E. Spear.

Ridgway, Elk Co., Pa.—J. H. McEwen Manufacturing Co.; capital, $100,000; for the purpose of manufacturing iron and steel in all shapes and forms from either of the metals; incorporators: J. H. McEwen, B. E. Cartwright, Jno. A. Ross, D. C. Oyster.

Grand Rapids, Mich.—The Grand Rapids Chemical Fire Extinguisher Co.; capital, $5,000: for the manufacture and sale of apparatus and chemical solutions for extinguishing fires; incorporators: Jas. R. Smith, Geo. H. Corbin, Grand Rapids, Mich.

Hamilton, O.—The Gwinner Manufacturing Co.; capital, $20,000; for the manufacture and sale of castors, stove trucks, grocers' trucks, etc.; incorporators: William R. Elber, Addison L. Underwood, Lewis Gwinner, Geo. E. Seidel, J. K. Hammerle.

Rockford, Ill.—The Rockford Folder Co.; capital, $25,000; for the manufacture of newspaper and book folders, mailing machines and articles used in that department of newspaper business; incorporators: J. D. Waterman, Paul F. Schuster, W. H. Keig.

Chicago, Ill.—The Corning Steel Co; capital, $250,000; for the manufacture of iron and steel and other metals, into any merchantable form and fitting same into any structural form and erection thereof; incorporators: Chas. S. Corning, Frank B. Felt, Wm. O. Johnson.

Chicago, Ill.—The Landis Steel Curbing Co.; capital, $75,000; for the manufacture of street curbing, sidewalks, barn and stable fronts and forebays, railroad ballast, water basins, water course, rip-rap tenacing; incorporators: Loyal L. Smith, Fred L. Brooks, John J. Rooney.

Allegheny, Pa.—The Novelty Manufacturing Co.; capital, $10,000; for the purpose of manufacturing and selling articles composed in whole or in part of iron, brass, metal or wood; incorporators: Fred. Waldschmidt, August Wigand, both of Allegheny, Pa.; Robt. Roberts, Malvern, O.

Jackson, O.—The Buckeye Coal & Iron Co.; capital, $400,000; for the manufacture and sale of iron, mining, shipping and selling coal, iron ore, limestone, fire clay, fire brick, etc.; incorporators: M. L. Sternberger, Ira A. Sternberger, John E. Jones, T. S. Matthews, H. S. Willard.

Annville, Pa.—The Lebanon Valley Hedge & Wire Fence Co.; capital, $20,000; for the purpose of manufacturing hedge and wire fence by the process of plushing and wiring and selling the same; incorporators: David Kreider, S. L. Brightbill, both of Annville, Pa; J. Luther Gallatin, York, Pa.

Peoria, Ill.—Luthy & Co.; capital, $125,000; for the purpose of manufacturing and dealing in farm machinery, buggies, binder twine, bicycles and such other merchandise as is usually handled in connection therewith; incorporators: Ferd. Luthy, C. M. Luthy, C. T. Luthy, E. P. Blake, C. A. Paul.

Chicago, Ill.—Guillaume Drying Apparatus Co., (incorporated in West Virginia); capital, $500,000; for the purpose of manufacturing, selling and leasing drying machines; incorporators: Thos. T. Oliver, Thos. S. Oliver, Alfred Guillaume, Newton P. R. Hatch, Wm. A. Ball, all of Chicago, Ill.

Terre Haute, Ind.—Central Equipment Co.; capital $50,000; for the purpose of manufacturing and letting to hire of freight cars of all descriptions, and the maintaining and transacting of business incident to such purposes; incorporators: Robert S. Cox, Lewis J. Cox, Harry J. Baker, all of Terre, Haute, Ind.

Chicago, Ill.—Excelsior Heating Co.; capital, $35,000; to manufacture, buy, sell and deal in steam and other engines, boilers, heaters, and power generating, and steam heat supplying apparatus and machinery and appurtenances for power plants; incorporators: H. W. Walker, M. J. Sheridan, C. E. Ferreira.

Philadelphia, Pa.—International Chain & Cable Co., (incorporated in West Virginia); capital, $250,000; for the purposes of manufacturing from iron or metal by machine or hand work, chains of all kinds and cables for vessels, car couplings, swivel hooks, links, etc.; incorporators: Wm. J. Merrill, G. O. Shakespeare, T. S. Rodgers, all of Philadelphia, Pa.

Chicago, Ill.—The Master-lode Nickel Mining Co.; capital, $1,000,000; for the purpose of mining, smelting, reducing, refining, working and quarrying all kinds of metallic ores, coal, paint, clay, etc., boring for oil, gas, making brick and building material; also to own, lease or sell personal and real estate, and borrow money and pledgd same as security; incorporators: A. M. Stearns, W. C. Dresser, James A. Smeallie.

Chicago, Ill.—The Chicago Vertical Safety Gate Co.; capital, $500,000; to manufacture, sell and put in general use safety gates to protect railroad crossings, approaches to bridges, intersections of street or road crossings and all other places where gates of any kind may be required for protection; incorporators: Ezra W. Jackson, Henry Jackson, E. J. Mills.

Chicago, Ill.—New Chicago Gas Governor & Regulator Co.; capital, $2,000; for the manufacture, use, rental and sale of gas governors and regulators, gas pressure appliances and gas burners and fixtures, also the purchase and sale of patents connected with said business; incorporators: Van H. Higgins, Eugene C. Long, Wm. D. Smith, Milton O. Higgins.

Chicago, Ill.—The Siphon-Ventilator Co.; capital, $150,000; for the purpose of ventilating and heating, drying, smoke-consuming and fuel-saving (including exhausting and management of air currents), acquiring patents and inventions and interests in same and manufacturing for said objects, selling and disposing of any of its property or applying it to said objects; incorporators: Henry N. Mann, Francis S. E. Gunnell, Geo. M. Robinson.

OTHER NEW ENTERPRISES.

It is reported that C. E. Baker, of Rock Run, Ala., will establish a machine shop at Acworth, Ga.

The Nowlin Safety Switch & Signal Co., of Chicago, has been organized, with $500,000 capital stock.

At New Brunswick, N. J., the Gyre Centrifugal Machine Co. has been incorporated, with a capital of $22,000.

The Port Townsend Steel Wire & Wire Nail Co. has been incorporated at Port Townsend, Wash., with a capital stock of $100,000.

The Chicago Steel Casting Co., of Chicago, Ill., has been incorporated with capital stock of $50,0000, by W. K., S. P. and L. J. Shelly.

The Phelps Manufacturing Co. has been incorporated at San Francisco, Cal., with a capital of $300,000, to manufacture iron, steel, etc.

The Savannah American & Montgomery Railroad Co. is reported as to erect machine shops and roundhouse at Clisby's Park, Montgomery, Ala.

The Nail City Stamping Co., with a capital limited to $1,000,000, has been incorporated at Charleston, W. Va., by J. N. Vance, A. W. Paul and others.

The Manhattan Type Foundry of Fort Lee, N. J., has been incorporated, with a capital of $50,000, to manufacture type, printing presses, machinery, etc.

The Ohio Falls Power Co. has been incorporated, at Louisville, Ky., with J. Proctor Knott, President; A. S. Willis, Vice-president; and George Du Belle,

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The Look & Lincoln Co., Marion, Va., has been organized, with a capital of $100,000, for the manufacture of agricultural implements, etc. N. L. Look is President.

The Drummondville Foundry, Drummondville, Que., is being incorporated with a capital stock of $24,000, for the purpose of manufacturing iron castings, millwork machinery, etc.

The Acme Motor and Machine Co., of East St. Louis, Ill., has been incorporated with a capital stock of $500,000. The incorporators are John F. Pollock, James M. Lohring and Charles A. Lohring.

Wm. Thomas, J. F. Green, J. T. Hoge and others have incorporated, at Baltimore, Md., the Thomas Novelty Co., to carry on a manufacturing, mechanical and industrial business. The capital stock is $25,000.

The Fisher Smokeless Furnace Co., of Chicago, has been incorporated, with a capital stock of $250,000, for the manufacture of smoke devices. The incorporators are William F. Fisher, C. H. Sieg and W. G. Williams.

George B Hayes, President of the Buffalo Cast Iron Pipe Co., has purchased a tract of land at Buffalo, N. Y., on which he will erect a new pipe works with a capacity of 60 tons a day. The main building will be 125x300 feet.

The Ohio Lawson Non-Explosive Boiler Co. Columbus, O., capital, $300,000, has been organized for the purpose of manufacturing steam boilers and other machinery; incorporators, A. H. McAlpin, Wm. Felton, H. A. Axline, Charles G. Lord, J. C. Taylor, D. T. Lawson, S. B. Campbell.

The Southwestern Bridge Co. has been incorporated with capital stock of $100,000, and principal office at Little Rock, Ark. The company will manufacture all kinds of iron, wooden and combination bridges, especially self-supporting suspension structures. W. B. Woody, of Rockdale, Tex., is President, and T. M. Freeman, of Little Rock, Ark., Secretary and Treasurer.

The city of Lima, O, at a meeting held January 4, has decided to ask the Legislature to pass an enabling act warranting the use of $150,000 by taxation for the purpose of inducing manufactories to locate there. The movement grew out of a report that the Lafayette Car Works, employing 500 men, would be removed from the city. The Lima Machine Works, which employ 200 men, are crowded for room, and as their plant is an excellent one, the first move will probably be to buy theirs and locate some new industry in it. The machine works then propose, it is understood, to buy the Lafayette Car Works plant and enlarge their business by a consolidation of interests. The remainder of the money will be used in influencing new industries to locate in Lima.

Additions, Enlargements, Removals, Etc.:—

The Wright Machine Co., of Worcester, Mass., will erect a building at that city.

The Reliance Wire Works Co., Milwaukee, Wis., will start the erection of its new plant.

There is talk of increasing the capacity of the Gilbert Car Works, at Green Island, Troy, N. Y.

A foundry department is being added to the Lewis Foundry and Machine Co., of Chicago, Ill.

Kenyon Brothers are rebuilding their foundry plant at Raritan, N. J, on a much increased scale.

It is stated that the White Sewing Machine Co., Cleveland, O., will build a factory 82x100 feet, to cost $17,000.

An addition is to be constructed to the New Castle Wire Nail Works. The proposed structure will be 57x130 feet. When the new building is completed the Wire Nail Works will cover about 15,575 square feet of ground, and will be the largest plant of the kind in the world.—[New Castle (Pa.) Guardian.

It is stated that the Louisville and Nashville railroad will erect car shops at Birmingham, Ala., to cost $40,000.

The Youngstown Manufacturing Car Co., of Haselton, O., are building a new foundry. The building will be 100x60 feet, and the equipment will be modern in every particular.

Plans have been prepared for a factory addition for the Bridgeport Machine Tool Co., at Bridgeport, Conn. The building will be 73x82 feet, two stories, built of brick, and cost $10,000.

The Eureka Transportation Co. will shortly establish a plant at Kansas City, Mo. The company have a capital stock of $2,000,000 and have car manufactories at Litchfield, Ill., Lafayette and Indianapolis, Ind.

The Pittsburgh Locomotive Works, whose plant is located in Allegheny, Pa., have prepared plans for an extensive addition to their works. Work on this addition will probably not be commenced for several months yet.

The Sharon Steel Casting Co., of Sharon, Pa., has found it necessary to increase its facilities for production, as with the present equipment it is unable to fill all the orders received. With this object in view the firm is erecting a Bessemer plant to contain two four-ton converters, the building to be of wrought iron 105x75 feet in size, which addition is to be used for the manufacture of steel castings. Heretofore the firm has only made open-hearth steel castings, but owing to the many demands for soft steel castings, the company has decided to erect a Bessemer plant and manufacture them.

Fires and Accidents:—

The S. Obermayer Foundry Supply Manufacturing Co., Cincinnati, O., were damaged by fire a few days since to the extent of $500.

During the recent conflagration at Nashville, Tenn., the plant of the Waters-Allen Foundry Co. was destroyed. The loss put is at $40,000.

The machine shops of the New York, Susquehanna & Western Railroad at Wortendyke, N. J., have been destroyed by fire, at a loss of $20,000.

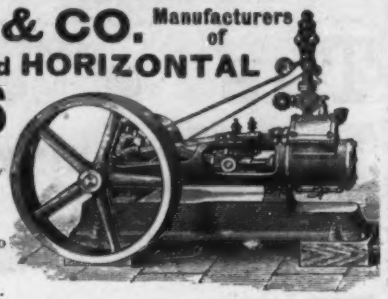
General Industrial Notes:—

S. M. L. Godfrey, of London, England, is at Youngstown, O., says a press dispatch, in the interest of the English syndicate that proposed to buy up several of the largest iron plants at that place. A new option will possibly be given on $5,000,000 worth of rolling mill property in the valley, the greater part of which is owned by the Wicks.

William Tod & Co., of Youngstown, O., are building for the Central Iron Works, of Harrisburg, Pa., a pair of 30″x60″ reversing engines. Of the larger sizes of Porter Hamilton engines they have under way a 36″x48″ for the Riverside Iron Works, of Wheeling, W. Va; a 36″x48″ and a 28″x42″ for the American Tin Plate Co., of Elwood, Ind., and a 22″x27″ for the Maumee Rolling Mill Co., of Toledo, O.

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburgh, Pa., are crowded with orders in all their departments, amongst the orders received was one for the National Tube Works, McKeesport, Pa., to rebuild a 700 horse-power engine, putting on a new cylinder with Freeman's patent valves, also

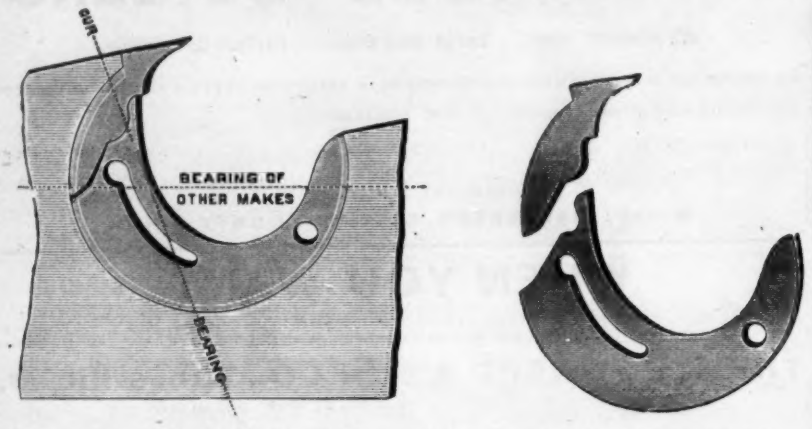
THE JAMES LEFFEL & CO. Manufacturers of
IMPROVED UPRIGHT and HORIZONTAL
ENGINES & BOILERS
3 TO 26 HORSE POWER.
STRONGLY BUILT on BEST Principles for SMOOTH and ECONOMICAL WORK.
Over 4000 in Use.
Write for free PAMPHLET and state your wants to
THE JAMES LEFFEL & CO.
SPRINGFIELD, OHIO or NEW YORK CITY.



putting balance valves on two other 500 horse-power engines, 13 rolls of different kinds, and also one of their new improved roll lathes, and a heavy fly-wheel 15 feet in diameter. The Aliquippa Steel Co. have also placed an order with them for one of their improved roll lathes.

CLASS' IMPROVED CHISEL TOOTH SAW.

The Canton Saw Co. have recently put upon the market a new saw, patented in the last few months, illustrations of which we present herewith. This saw has been tested and has proven to have advantages possessed by no others



The patent spring holder will take in teeth varrying in width or thickness, without changing the tension of the saw. The pressure from the teeth is downward, toward the center, while in others, it is usually from side to side of openings. All who have this saw pronounce it to be perfect, and express themselves very well satisfied with the way in which it works. For further particulars, price lists, etc., address The Canton Saw Co., Canton, O.

New Corporations in 1891.

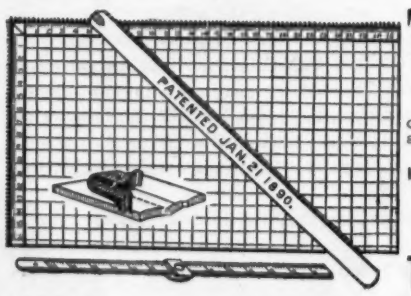
The following table compiled from the files of the United States Corporation Bureau shows the total number of companies incorporated in the United States in the year 1891:

	Number.	Capitalization.
Mercantile and Manufacturing Cos	6,656	$1 073,244,144
Gold, silver and other mining and smelting Cos.	1,219	1,034,602,900
Coal and iron Cos	358	133,471,830
Banks and investment Cos	768	257,164,800
Light, heat, power and transportation Cos	1,015	681,649,350
Building and loan associations	572	1,709 183 640
Miscellaneous Cos	4,706	841,576 128
Total	5,294	$5,730,892,792

CLEVELAND
GALVANIZING
WORKS.
H. H. HODELL & CO.,
Galvanizing in all its branches, and Manufacturers of Rubber Buckets for chain pumps.
CLEVELAND, OHIO.

DIXON'S
GRAPHITE
PAINT

THOSE who use it say that one pound will cover 2 to 3 times more surface and last 4 to 5 times longer than any lead, mineral or metallic paint. A tin or iron roof well painted will not require repainting for 10 to 15 years.
JOS. DIXON CRUCIBLE CO.,
Jersey City, N. J



The Canton Glass Board.
Cuts any Fraction of an Inch by Eights.
Unequaled for accuracy and quick work in cutting square or at any angle. Saves breakages, etc.
—ALSO—
IMPROVED TRAMMEL RULE for Cutting Circles
From 3 inches up to 48 inches, Segments, Gothic Shapes etc.
Send for Circular.
The Canton Saw Co., Canton, O.

Alphabetical List of Advertisers

The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month the double dagger (‡) once in three weeks.

	PAGE
Aitchison, Rob't Perforated Metal Co	19
Adt, John & Son	14
†Armstrong Bros	—
American Bridge & Iron Co	18
Buckeye Engine Co	24
Burton, W. J. & Co	18
Bischoff, F. F. & Co	20
*Berger Mfg. Co	—
Babcock & Wilcox Co	24
Buffalo Specialty Mfg. Co	22
Bostwick Steel Lath Co	17
†Butman Furnace Co	—
Barr Electric Mfg. Co	21
Cleveland City Forge & Iron Co	24
Cleveland Twist Drill Co	24
Cleveland Iron Mining Co	17
Cleveland Rolling Mill Co	17-20
Cleveland Desk Co	17
Condit Fuller Co	17
*Copeland & Bacon	—
Colliau, Victor	21
Canton Iron Foundry Co	—
Cambridge Roofing Co	23
Cole, J. Wendell	24
Chester Steel Casting Co	24
Corrigan, Ives & Co	17
Canton Saw Co., The	16
Deming Co	22
Dixon, Jos., Crucible Co	16
Egan Co	19
Edison General Electric Co	19
Eberts Bros	24
Eclipse Electrotype & Engraving Co	20
Frank & Co	22
Fleharty, J. H & Co	20
Fitzgerald, W. T	18
Graham Twist Drill Co	24
Garvin Machine Co	19
*Garfield Injector Co	—
Garry Iron Roofing Co	23
Graves, L. S. & Son	19
Gerlach, Peter & Co	17
*Gillette & Lewis,	19
Hazelton Tripod Boiler Co	22
Hutchison, W. S	24
Harrington & King Perforating Co	17
*Hodell, H. H. & Co	16
Hartford Steam Boiler Insp. & Ins. Co	20
Hackney Hammer Co	15
Hartman Sliding Blind Co	20
Hercules Powder Co	22
*Holbrook & McDonald	—
Iron Clad Paint Co	23
Industry File Works	24
Jones, E. H. & Co	22
Jeffrey Mfg. Co	18
Jenks, James	16
Kanneberg Roofing Co	23
*Leffel, Jas. & Co	23-15
*Long Steel & Iron Roofing Co	—
Ladd, Alfred W	21
Milton Mfg. Co	19
*Munn & Co	—
*McCombs, C. E	23
Michigan Emery Wheel Co	21
*Neracher Sprinkler Co	14
New Philadelphia Iron & Steel Co	16
*Niles Iron & Steel Roofing Co	19
Outhwaite, J. H. & Co	17
Oglebay, Norton & Co	17
Oldfield, L. H	20
Pope, E. C	17
Parkin & Bosworth Co	24
Palmer, Cunningham & Co	18
Pittsburgh & Wheeling Coal Co	17
Penberthy Injector Co	24
Pollock, Wm. B. & Co	22
Pratt Chuck Co, The	21
Rogers & Hubbard Co	20
Rowell, Geo. P. & Co	19-16
Reynolds Bros	24
Schleicher, Schumm & Co	22
Sykes Iron Roofing Co	23
Sackman, F. A	18
Southwark Foundry & Machine Co	23
Stirling Co	15
Stilwell & Bierce Mfg. Co	24
Spicer Mfg. Co	19
Shepard, H. L., Agent	21
Skinner Engine Co	23
Stevens, F. B	23
Satterthwaite, M. P	19
*Simpson, Thos. P	18
Sterling Grate-Bar Co	18
Toledo Machine & Tool Co	22
Tod, Wm. & Co	22
Totten & Hogg Iron & Steel Foundry Co	16
Van Duzen Gas Engine Co	20
Upson Nut Co	20
Union Electrotype Foundry	18
Universal Radial Drill Co	24
Unger & Wigham	23
Union Photo Engraving Co	16
Webster, Warren & Co	24
West, Thos. D. Foundry Co	19
Westinghouse Machine Co	23
Wyckoff, Seamans & Benedict	21

A SPLENDID CHANCE
TO ESTABLISH YOURSELF IN A
Good Paying Business.
I have for sale a small MACHINE SHOP with good Tools, now manufacturing specialties and a good jobbing trade offered. LOW RENT. Can work into a big business. Call on or address
JAMES JENKS.
Dealer in Machinery, DETROIT, MICH.

To Advertisers

If you wish to advertise
and need instruction, send one dollar for our "Book for Advertisers." A little study of that book will enable you to decide what you ought to do, and give an idea of the probable cost.

If you instruct us
to place a certain amount of advertising for you in the way we think will do you the most good, you should send an explicit statement of what you wish to accomplish, and make suitable arrangements for payment. Your order will then receive all the attention that it requires.

If you wish an advertisement
prepared and a plan of advertising marked out; to be told what papers you should use, and what the cost will be, we will furnish the advertisement and the plan—either or both, and submit them for your consideration, together with our bill for the service.

For preparing advertisements,
electrotypes and estimates the advertiser pays us. For the expense of placing advertisements and watching the fulfillment of contracts we are paid by a commission allowed by the publisher of the paper in which the advertisement appears.

If you want to learn
all the ins and outs of advertising without any cost or trouble, read PRINTERS' INK regularly, carefully, studiously; issued weekly, $2 a year.
If you wish a complete catalogue of all newspapers, send $5 for the American Newspaper Directory.
For any further information address
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MANUFACTURERS OF
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FOR Roofing, Galvanizing, AND ALL OTHER PURPOSES.
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TRADE MARK
OFFICE AND WORKS
NEW PHILADELPHIA, OHIO.

Elastic Rotary-Blow Riveting Machine.

JOHN ADT & SON,
NEW HAVEN, CONN.
Builders of Machinery for Hardware Manufacture.
AUTOMATIC
Wire Straightening and Cutting Machines,
BUTT MILLING MACHINERY,
Butt Drilling Machinery,
Riveting Machines,
Foot Presses,
Sprue Cutters, Etc.

PERFORATED METALS OF EVERY DESCRIPTION BY THE HARRINGTON & KING PERFORATING CO. CHICAGO.
284 Pearl St., cor. Beekman. NEW YORK.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 00 @16 75; Southern Coke No. 2 Foundry, $15 00 @15 75; Southern Coke No. 3 Foundry, $14 25 @15 00; Southern Coke No 1, Softeners, $15 00 @15 75; Southern Coke No. 2, Softeners, $14 25 @15 00; Ohio Silveries No. 1, $17 50@18 50; Ohio Silveries No. 2, $16 50@ 17 50; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 00@18 00; Lake Superior Charcoal Nos. 1 to 6, $17 00@18 00; Tennessee Charcoal No. 1, $1700@18 00; Tennessee Charcoal No. 2, $16 50@17 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $14 75@15 25; Southern coke, No. 2 and No. 1 soft, $13 75@$14 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 00; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $17 00@17 50; Hanging Rock Charcoal, No. 1 foundry, $19 75 @21 00. MILL IRONS—Standard Southern Coke, grey forge, $12 50@12 75; Standard Southern Coke, mottled, $12 25@12 50; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 00@20 00; Tennessee Car Wheel, $18 00@19 00; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $16 00@16 50; Mahoning and Shenango Valley strong, No. 2 Foundry, $15 00 @15 50; Ohio Softener No. 1, $16 20@16 50; Ohio Softener No. 2, $15 20@15 50; Jackson Co., Silvery No. 1, $18 00@00 00; Jackson Co. Silvery, No. 2, $17 00@00 00; Lake Superior Charcoal, $18 50@00 00; Tennessee Charcoal, $18 25@00 00; Southern Softener No. 1, $15 75@00 00; Southern Softener No. 2, $15 00@00 00; Southern Strong No. 1 Foundry, $16 75@00 00; Southern Strong No. 2 Foundry, $15 75@00 00; Alabama Car Wheel, $19 75@20 75; Hanging Rock Charcoal, $21 00@22 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 50@14 00; Southern coke No. 3, $13 00@13 25; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 00@17 00; Southern charcoal, No. 2, $15 50@16 00; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@12 75; Cold short, $12 25@12 50; Mottled, $11 75@12 00. CAR WHEEL AND MALLEABLE—Southern (standard brands), $19 00@ 19 50; Southern (other brands), $17 00@18 00; Lake Superior, $20 00@21 00.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 50@14 75; Southern Coke No. 3, $13 75@14 25; Southern Grey Forge, $13 25@ 13 50; Southern Charcoal No. 1, $17 25@17 75; Southern Charcoal No. 2, $16 75@17 25; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@ 19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $19 50@20 00; Southern, $19 50@ 20 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $5 65.

DETROIT (reported by William F. Jarvis & Co): Lake Superior Charcoal, all Numbers, $17 00@18 00; Lake Superior (coke) Bessemer, $16 50@17 00; Katahdin (Maine charcoal), $00 00 @00 00; Lake Superior Coke, Foundry, all ore, $17 50@18 00; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 50; Southern No. 1 $16 25@16 50; Southern Gray Forge, $14 00@ 14 50; Jackson County (Ohio) Silvery, $18 25@ 18 75; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 25@ 15 75; Southern Coke No. 2 Foundry $13 50@ 13 75; Southern Coke No. 3 Foundry $12 75@ 13 35; Grey Forge, $12 50@13 00; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $15 75@16 75; Car Wheel, $17 75@19 75.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $15 50@16 00; No. 2 Foundry, $14 50@15 00; Grey Forge, $13 50@13 75; White and Motfled, $13 00@13 25; Warm Blast Charcoal, $18 00@22 00; Cold Blast Charcoal, $22 00 @26 00; Bessemer, $15 25@15 75.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅛ to 1 inch	1 70
4½ to 6 by ⅛ to 1 inch	1 55
1½ to 6 by 1⅛ to 2 inch	2 15
1¼ & 1⅜ by ¼ to ½ inch	1 85
1 & 1⅛ by ¼ to ½ inch	1 95
⅛, ¼ and ⅜ by ⅛ to ½ inch	2 15

Round and Square.

¼ to 1⅞ inch	1 75
2 to 2½ inch	1 95
2½ to 3½ inch	2 25
3⅝ to 4 inch	2 75
4⅛ to 4⅜ inch	3 25
4⅝ to 5 inch	3 45

Ova

⅜ to 1¼ inch	2 15
⅜ to ½ inch	2 25
⅝	2 55
¾	2 95

Half Oval and Half Round.

⅜ to 3 inch	2 85
⅜ to 1¼ inch	2 45
⅜ to ½ inch	2 05
⅝	2 25
¾	4 75

Heavy Band.

½ to 6 by ¼ and 5-16 inch	1 55
½ to 1¼ by ¼ and 5-16 inch	2 05
½ to ⅞ by ¼ and 5-16 inch	2 25
to ⅞ by ¼ and 5-16 inch	3 75

Hoops.

1¼ to 4, Nos. 13 to 15	2 55
1¼ to 2, Nos. 16 to 18	2 65
1¼ to 2, No. 19	2 75
1¼ to 2, No. 20	2 85
1¼ to 2, No. 21	2 95
1¼ to 2, No. 22	3 05
15-16, 1 and 1⅛, Nos. 13 to 15	2 75
15-16, 1 and 1⅛, Nos. 16 to 18	2 85
15-16, 1 and 1⅛, Nos. 19 and 20	2 95
15-16, 1 and 1⅛, No. 21	3 05
15-16, 1 and 1⅛, No. 22	3 15
⅞, Nos. 13 to 15	2 95
⅞, Nos. 16 to 18	3 05
⅞, Nos. 19 and 20	3 15
⅞, No. 21	3 25
⅞, No. 22	3 35
13-16, Nos. 13 to 15	3 15
13-16, Nos. 16 to 18	3 25
13-16, Nos. 19 and 20	3 35
13-16, No. 21	3 45
13-16, No. 22	3 55
¾, Nos. 13 to 15	3 25
¾, Nos. 16 to 18	3 45
¾, Nos. 19 and 20	3 55
¾, No. 21	3 65
¾, No. 22	3 75
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 65
11-16, Nos. 19 and 20	3 75
11-16, No. 21	3 85
11-16, No. 22	3 95
⅝, Nos. 13 to 15	3 75
⅝, Nos. 16 to 18	3 95
⅝, Nos. 19 and 20	4 05
⅝, No. 21	4 15
⅝, No. 22	4 25
⅝, No. 23	4 45

Light Band.

1¾ to 6 by ⅛ to 3-16 in	2 20
1¾ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅞ and 13-16 by ⅛ to 3-16 in	2 70
⅞ and 1 3-16 by Nos. 11 and 12	2 80
¾ and 11-16 by ⅛ to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by ⅛ to 3-16 in.	3 30
⅝ and 9-16 by Nos. 11 and 12	3 40
½ by ⅛ to 3-16 in	3 60
½ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12	2 80
⅝ inch, " " " 13 and 14	3 00
¾ inch, " " " 11 and 12	3 10
¾ inch, " " " 13 and 14	3 30

Sheet Iron.

No. 10 to 14	2 45
No. 15 to 17	2 55
No. 18 to 21	2 75
No. 22 to 24	2 85
No. 25 to 26	2 95
No. 27	3 25
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1 " "	2 50
C H Flange, " "	3 50
Extra Flange, "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	08
9-16 to ⅞ in "	08½
7-16 to ⅝ and 2⅛ to 3 in	09
3⅛ to 4 in	09½
⅝ to 11-16 and 4⅛	10
⅝ to 6 in	10⅝
¼ to 9-32 and 6⅛ to 7 in	11
5-6 in	13

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 35
Tire	"	2 25
Spring	"	2 80
Sleigh Shoe	"	2 50
Toe Calk	"	2 35
Cutter Shoes, tapered and burr.	"	2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	15c

Burden Boiler Rivets.

⅛, ¾, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ¾, 11-16 and ¾ inch diam	4 00

SCRAP IRON AND OLD METAL.

	Net Tons
No. 1 R. R. wrought scrap	$18 00
No. 1 wrought scrap	16 50
No. 1 Machine cast scrap	11 50
Iron axles	23 50
Axle turnings	13 50
Wrought turning (free from cast)	11 50
Cast borings	8 00
Uncut wrought iron boilers	11 50
Steel boiler plates	16 00
Grate Bars	8 00
Pipes and flues (Clean)	12 00
Tank iron	12 50
Hoop and band iron	9 50
Sheet iron	8 50
Wrought drillings	11 00
Malleable iron	9 50

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

CLEVELAND ROLLING MILL CO.,
MANUFACTURERS OF
BESSEMER AND OPEN-HEARTH STEEL,
Blooms, Billets, and Slabs. Steel Rails, Steel Beams, Channels and Angles. Steel Forgings. Bar, Spring and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire. Iron and Steel Plates. Galvanized and Black Sheet Iron and Steel. Corrugated Iron Roofing.

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The Cleveland Printing & Publishing Co.,
Cleveland, O.

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MINERS AND SHIPPERS OF
Ohio Steam Coal and Coke.
Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.
Office, 6 Mercantile Bank Building, CLEVELAND, OHIO.
Lake Shipping Point, Lorain O
JAS. PATTERSON, Sales Agent.

CORRIGAN, IVES & CO.,
DEALERS IN
Iron Ore & Pig Iron,
Rooms 716, 717, 718, 719 Perry-Payne Bld'g.
CLEVELAND, O.

OGLEBAY, NORTON & CO.,
Successors to Tuttle, Oglebay & Co.,
Commission Dealers in
Iron - Ores,
FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,
CLEVELAND, OHIO.

J. H. OUTHWAITE. W. G. POLLOCK.
J. H. OUTHWAITE & CO.,
Exclusive attention given to
LAKE SUPERIOR AND MENOMINEE RANGE
Iron Ore,
Perry-Payne B'ld'g. Cleveland, O.

THE CONDIT-FULLER CO.,
Pig and Bar Iron,
CLEVELAND, OHIO.

E. C. POPE,
COMMISSION DEALER IN
Iron Ore, Pig Iron
AND METALS.
Cleveland, - Ohio.

Sam'l. L. Matnei, Prest. & Treas. Fred. A. Morse, Sec'y.
Cleveland Iron Mining Co.,
Dealers in Iron Ores
from their own mines near Marquette, Lake Superior.
Rooms 4 & 5 Mercantile Bank Building,
CLEVELAND. O.

BOSTWICK PATENT.

A great saving in mortar, material and labor Write for Catalogue and Sample.
THE BOSTWICK STEEL LATH CO.,
38 Park Row, New York City. Niles, O
Mention this Paper.

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PETER GERLACH & CO.,
MAKERS OF
Saws, Tools and Machinery.
Office and Warerooms, 28 Columbus st. Factories on Columbus, Winter and Leonard streets.
Cleveland, O., U. S. A.

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BANK, RAILROAD
—AND—
OFFICE + FURNITURE.
Interior Work a Specialty.
Send for Illustrated Catalogue.
THE CLEVELAND DESK CO.
97-99 Ontario St., • • Cleveland, Ohio.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned....dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 25

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 25
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¾".....dis 50&10
Morse Taper and Straight shank Larger than 1¾".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	No. 4 to No. 54 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4¾c	5¾c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 1	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 62
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	2¾
Hexagon	15⅜	11¼	8⅝	6	5⅜	5⅛	5
Washers	9	8	7	5	4⅜	4⅛	4⅜

In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots$2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 1.25@2.50
Excelsior Rubber.....₩ lb 40

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¾ inch and over.....₩ lb 13¾
Sisal, ¾ inch and over.....₩ lb 13½

Sand Paper.

B. A. & Co.....dis45@50
H. H. Barton's.....dis40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 33c per pair
No. 6 " .....dis 16c
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

	Hand and Nut to 2 in.		
Cards,			dis 50
Carpenters'	"	"	dis 50
Morse	"	"	dis 50
Pratt & Whitney	"	" new list	dis 10
Machine Screw Taps			dis 55
Pipe Taps to 2½ in.			dis 70
Stay Bolt Taps			dis 25
Stove Bolt Taps			dis 50
Pulley Taps			dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅜lb Balls	31C@29c	
No. 18 " " ¼ and ⅜ "	18C@28c	
No. 36 " " ¼ and ⅜ "	16c@27c	
2-Ply Hemp, ¼ & ⅜ lb Balls (Spring Twine)	17½c	
3-Ply " 1lb Balls	12@12½c	
3-Ply " 1½ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75&5
" " Nos. 27@36..dis 75&10&5
Coppered Nos. 0 to 18, market list..dis 70@70&5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire, regular.....$6.00@lb dis 3

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis
William's " " .....dis
Alligator " " .....dis

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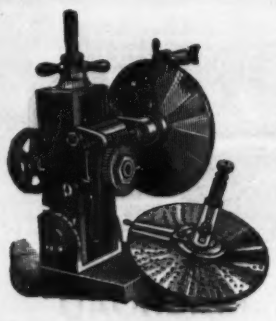

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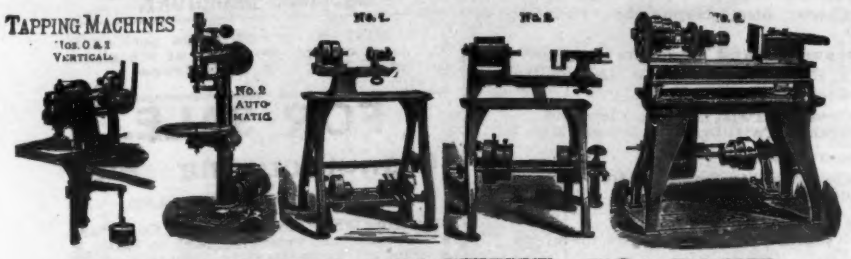

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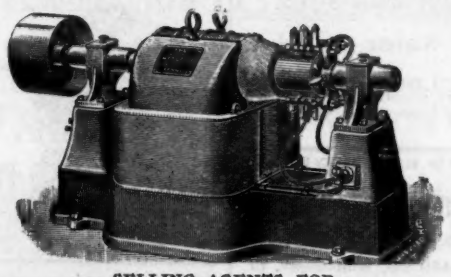

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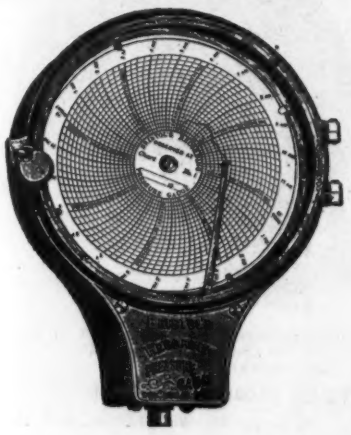

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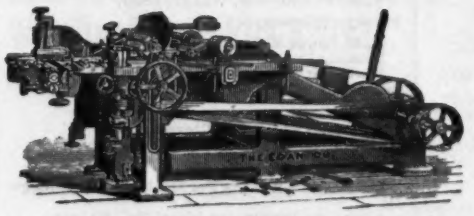

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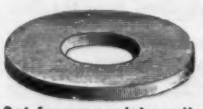

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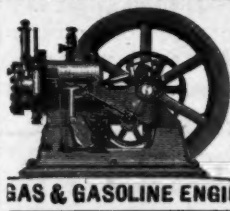

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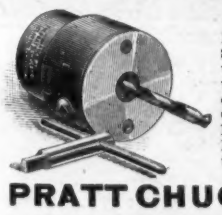

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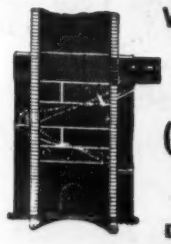

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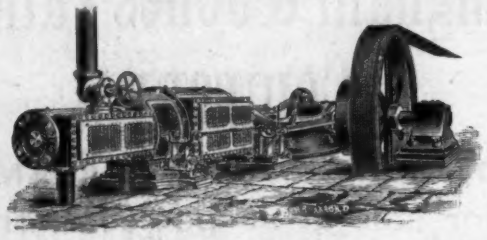

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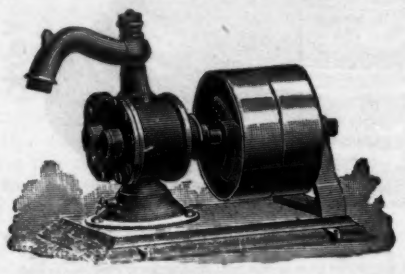

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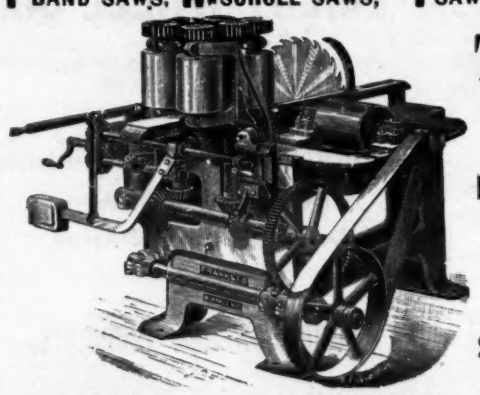

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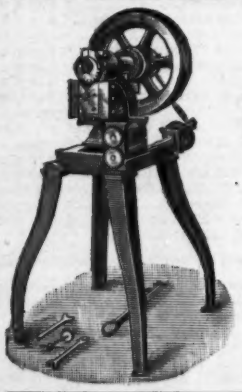

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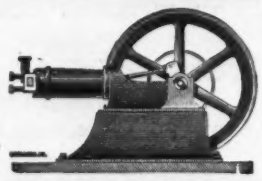

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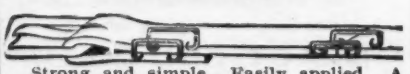

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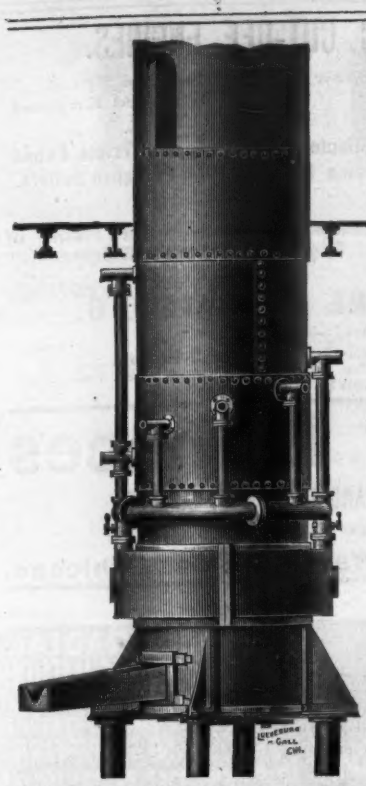

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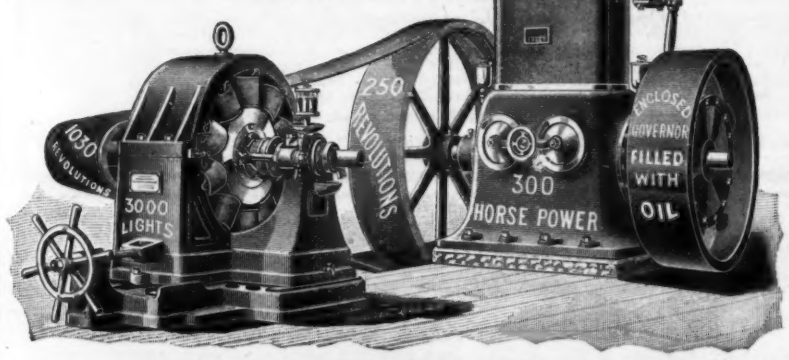

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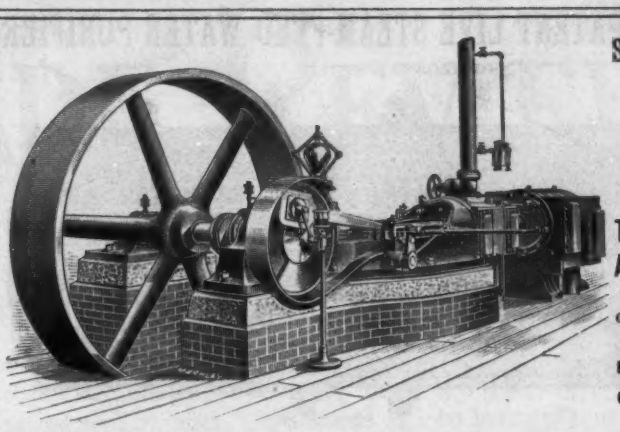

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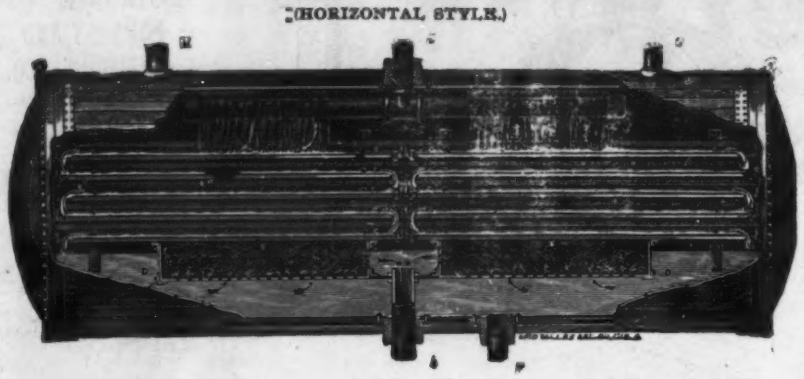

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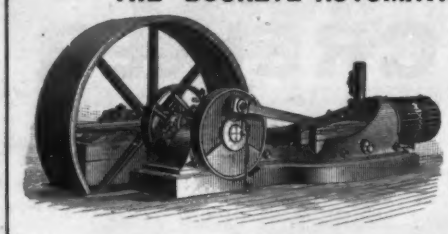

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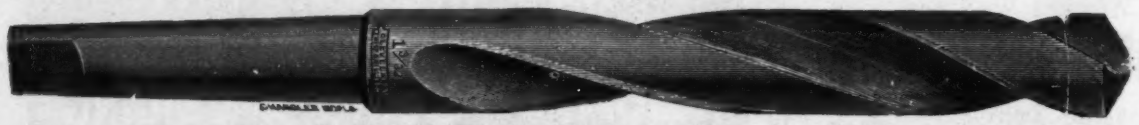

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